HUGHES™

DiRECWAY®

DW4020 Installation Guide

Declaration of Conformity

Standards to which Conformity is declared: FCC Part 15

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Responsible Party's name: Hughes Network Systems, Inc.

Address: 11717 Exploration Lane, Germantown, MD 20876

Telephone: 866-DIRECWAY (347-3292)

Trade Name: HUGHES

Type of Equipment:Satellite Transmit and Receive Modem, VSAT, Ethernet Appliance

Model Numbers:DW4-G1

Part Numbers: 3003618

HUGHES
NETWORK SYSTEMS

Document Serial Number: 0067

DECLARATION OF CONFORMITY

Application of Council Directives:

Low Voltage Directive:	*73/23/EEC with 93/68/EEC*
EMC Directive:	*89/336/EEC*
RTTE Directive:	*99/5/EC*

Standards to which Conformity is declared:

Safety:	*EN 60950; December 2000*
EMC:	*EN 301-489-12 V1.1.1, December 2000*

HNS Conformity Assessment Reports: *EMC – HNS 26634*
Safety – HNS 26637

Product(s): VSAT Product Category

DIRECWAY Ethernet Appliance

Model Number:	**DW4-G1 (3003618-XXXX)**
Serial Number:	All
Year of Start Manufacture:	2002

Manufacture's Name: Hughes Network Systems

Manufacture's Address: 11717 Exploration Lane, Germantown, Maryland, USA 20876

Importer's Name: Hughes Network Systems

Importer's Address: Saxon Street, Linford Wood, Milton Keynes, United Kingdom MK14 6LD

The conformity assessment has been done by the following location:
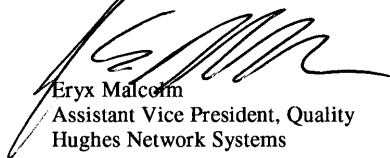**Washington Laboratories, LTD. 7560 Lindbergh Drive, Gaithersburg, MD 20879, USA**

The product carries the CE Mark:

$$\text{CE}$$

I hereby declare that the above named product is in conformity to all essential requirements of R&TTE, Low Voltage and EMC directives.

Signature: Place: Germantown, Maryland

Eryx Malcolm Date: April 23, 2002
Assistant Vice President, Quality
Hughes Network Systems

Contents

Important safety information

For your safety and protection, read this entire manual before you attempt to install the DW4020. In particular, read this safety section carefully. Keep this safety information where you can refer to it if necessary.

Types of warnings used in this manual

This section introduces the various types of warnings used in this manual to alert you to possible safety hazards.

⚠ DANGER

Indicates an imminently hazardous situation, which, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury.

CAUTION

Indicates a situation or practice that might result in property damage.

About this document

Scope and audience

This manual describes installing and servicing the DIRECWAY₍®₎ DW4020 terminal. It addresses installers, network system engineers, and network operators who install, commission, operate, and maintain the system.

Audience profile

The DW4020 is installed by professional telecommunications installers. This product cannot be installed by the end user.

There are four primary audiences:

- HNS Installers – at this time, only HNS installers will install this product.
- Installer trainers, who prepare separate instructions for the installers.
- Call center operators, who respond to user's calls.
- Call center trainers, who train call center operators.

Organization and updates

This manual is organized into the following chapters. Major changes from Revision 1 are identified.

Chapter 1 - *Introduction* gives an overview of the DW4020 and its components. The description of IP addressing is moved to an appendix.

Chapter 2 - *Installing the indoor equipment* provides information regarding installing and configuring the DW4020. The "modem" method using Websetup is documented. The "manual" method using the serial port is moved to an appendix.

Chapter 3 - *The User Interface* provides information about the new browser-based interface. The interface reports performance data and information for configuring operating systems network settings.

Chapter 4 - *DW4020 LEDs and troubleshooting* described LED activity and troubleshooting stratetgies.

There is also a safety summary, glossary, list of abbreviations and acronyms, appendices, and index.

Conventions

This manual follows the typographical conventions shown below to help clarify instructions:

Example	Explanation
Click **Exit**.	Indicates the names of command buttons that execute an action.
The system displays the following: `Are you ready?`	Indicates all system messages and prompts as the system displays them.
Type **exit**	Indicates operator input.
Enter a value in the Time field.	Indicates the names of fields on windows.
Retrieve the following file: *O:\template\techman_r3*	Indicates file names or file paths referenced in the manual.
Press **ALT+V** to view the menu.	Indicates function or keyboard keys. Press two keys simultaneously—in this case, Alt and V.
Select the **Edit** menu.	Indicates the names of menu bar options on a software screen.
Go to **Edit** → *Spelling Checker*	Indicates a menu/submenu sequence for selecting an action or option

Related publications

The installation of this product may also require the use of one of the following antenna or outdoor unit manuals:

- *DIRECWAY Satellite Dish Installation Guide Model: DW4000 Two-Way* (HNS 1031362-0201)
- *DIRECWAY Outdoor Unit Installation Guide DW 4000-098 DW 4000-120* (HNS 1032025-0001)
- *.89/.98M Ku-Band Rx/Tx Series 1892/1982 Antenna System Assembly Manual* (Prodelin 4906-629)
- *1.2m Ku-Band Rx/Tx Series 1132 Antenna System* (Prodelin 4906-630)

Revision record

Revision	Date of issue	Scope
Rev 1	8/02/02	Production release
Rev 2	9/27/02	Incorporates Web commissioning
Rev 3	10/24/02	Documents change to Websetup Welcome screen

Chapter 1
Introduction

This chapter addresses the following topics:

- *DW4020 purpose and components* on page 1
- *Characteristics and identification of equipment* on page 2

DW4020 purpose and components

The DW4020 is designed to provide multiple computer connections through a single DIRECWAY$_®$ terminal. It is composed of three stackable components as shown in Figure 1:

- Receive modem (also sometimes referred to as the Indoor Receive Unit (IRU))
- Transmit modem (also sometimes referred to as the Indoor Transmit Unit (ITU))
- Gateway (GWH)

✎ Note: Revision 1 of this manual referred to the DW4020 as the "Gateway," and the Gateway as the "Gateway host." This terminology has changed. Please use the terminology in this manual.

Receive modem

Transmit modem

Gateway

Figure 1: The DW4020

These units, in combination with an antenna, provide satellite connectivity for multiple local area network (LAN) hosts through one DIRECWAY System. All the necessary software resides on the Gateway, which serves as the router. Because the software is on the Gateway, there is no need for a computer to run client software, unlike previous versions of DIRECWAY.

Figure 1 illustrates the functionality of the DW4020 within a DIRECWAY network. Note that the DW4020 is independent of operating platforms. It can also be used with devices other than computers, such as point-of-sale (POS) terminals or credit verification devices.
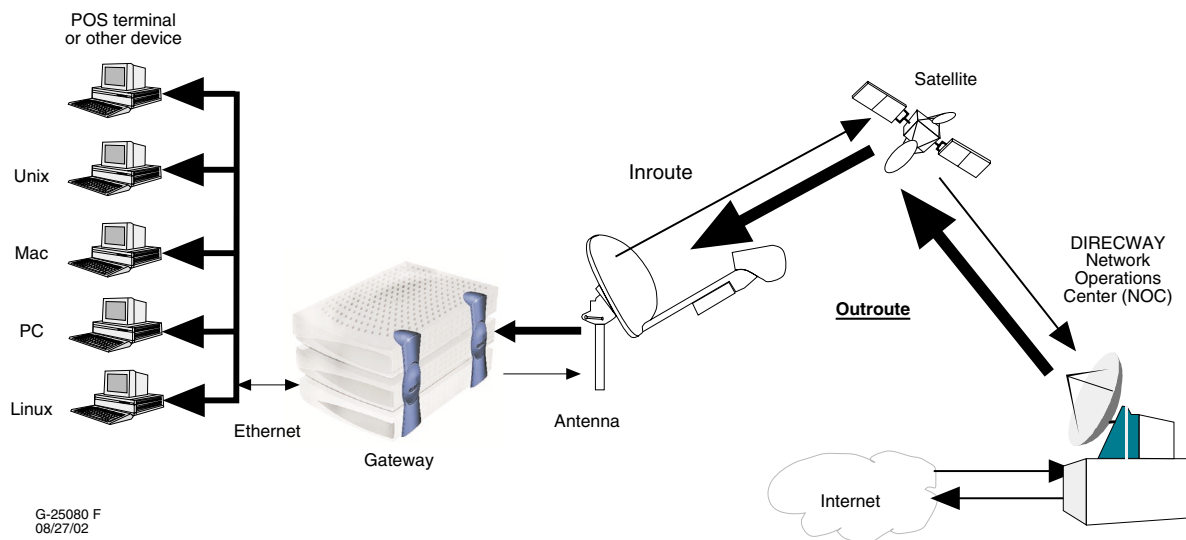
Figure 2: Remote site with DW4020 installed

Characteristics and identification of equipment

The part number label is located on the rear of the unit.

Table 1 shows the hardware characteristics of the DW4020.

Table 2 shows the physical characteristics of the unit.

Table 3 shows the cable requirements for the unit. The cable requirements are the same regardless of the type of antenna used.

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Table 1: DW4020 hardware characteristics

Characteristic	DW4020
Main processor	200Mhz
Ethernet 10/100	4 ports (switched) RJ-45
Main Memory	32MB
Flash Memory	8MB
Serial Port	Asynchronous RS232
USB Port	One USB 1.1 (Type A)

Table 2: DW4020 physical characteristics

Characteristic	Value
Physical Dimensions Height Width Depth Weight	 5.75 inches 6.5 inches 8.8 inches 4.0 lbs.
Electrical Requirements Input line voltage Input line frequency Current Required	 90 - 264 V ~ 2A max, 50-60 HZ AC 100 W typical

Table 3: Cable requirements

Grounding and Cable Choice
Your choice of grounding scheme may affect your choice of cable. Note that meeting the National Electrical Code grounding requirements is easier if you use RG-6 with quad shield. However, you can also use standard RG-6 and ground according to the Code or the instructions in the antenna installation manual.

Recommended cable specifications for One-Way and Two-Way Systems		
Cable length from satellite dish to DW4020	Type of cable to be used	
	Receive	Transmit
Up to 300 ft.	RG6 with solid copper center conductor (CommScope 5729 or equivalent)	RG6 with solid copper center conductor (CommScope 5729 or equivalent)
300 ft. to 420 ft.	RG6 with solid copper center conductor (CommScope 5729 or equivalent)	RG6 with solid copper center conductor and quad shield (CommScope 5781 or equivalent)
Important: A higher grade of cable can be used for an installation where a lower grade is specified. For example, an RG6 cable with solid copper center conductor and quad shield can be used for installations where the cable length is less than 300 ft. Never use a lower grade of cable than specified. Be sure to record the grade of the cable used for your installation. The grade is printed on the cable every few feet. Never use a cable which does not have the manufacturers name and its grade clearly printed on it!		

Important notes:

1. Coaxial cables with copper clad steel center conductor are not recommended.
2. Do not use splitters.
3. Line amplifiers are required for Receive cable runs of more than 150 ft.
4. If the Receive cable run length is less that 150 ft., then no line amplifier is required. If the Receive cable run length is greater than 150 ft., but less than 300 ft., then install a a line amplifier in the Receive cable only, at a minimum of 25 ft. and up to 30 ft. from the LNB.
5. A line amplifier can only be installed in the Receive cable, not in the Transmit cable.
6. Line amplifier specification: Channel Master 5113 IFD or equivalent.

Chapter 2

Installing the indoor equipment

System pre-installation

Together, the receive modem, the transmit modem, and the Gateway are called the DW4020 and sometimes referred to as the indoor unit (IDU). The receive modem is also called the IRU; the transmit modem is also called the ITU; and the Gateway is sometimes called the GWH.

The three units must be stacked correctly to ensure proper heat dissipation. The receive modem must be installed on top of the transmit modem, which is in turn installed on top of the Gateway. See Figure 10 on page 15.

Installation PC requirements

The installer laptop PC must fulfill the following requirements:

- USB port
- Ethernet
- Dial-out modem
- Windows 98 or higher, with DHCP configured to automatically accept IP addresses. See *Appendix D*.
- Websetup installed. See *Installing DIRECWAY installation software on installer laptop* on page 8.

Customer installation requirements

The customer must have:

- A functioning Ethernet interface installed on at least one computer. This is not necessary to commission the DW4020, but you must ensure the customer can surf before you leave.
- Ethernet cables; as many as there are computers that will connect to the DW4020.
- An analog phone line.

Two DW4020 installation methods

There two ways to install the DW4020.

- If an analog phone line is available, assemble and install the system using the instructions in *Installing the system using a modem* on page 11. This method is preferred and is usually the one that will be used.
- If no analog phone line is available, you must configure the DW4020 through the serial port. Follow the instructions in *Appendix C*.

Summary of DW4020 installation process

DW4020 installation is a 10-step process.

1. Assemble the DW 4020 components.
2. Connect the DW4020 to the installer PC Ethernet and power up the DW4020. Use surge protectors.
3. Connect the installer PC via USB and run Websetup to establish operating parameters and commission.
4. Register the customer and select subscription options via Websetup.
5. Record site ID and assigned IP address(es) for the customer on the cover of the User Guide.
6. Transfer of parameter information to Gateway Host; Exit Websetup.
7. Assemble and install the satellite antenna. Run cables from the outdoor components to the indoor equipment. Clearly label the receive and transmit coaxial cable at the antenna, ground block, and indoor units connectors.
8. Complete pointing and ACP.
9. Disconnect installer PC and connect the Gateway to the receive modem with the USB cable. Connect the customer computer equipment to the Gateway via Ethernet cable.
10. Verify customer operation, information recorded on User Guide cover, and receive and transmit cable labeling. Optional: assist in customer computer configuration.

Antenna installation

The DW4020 can be used with the HNS DW4000 74cm Two-Way antenna. The DW4020 can also be used in conjunction with 98cm, 1.2m, and 1.8m antennas. Refer to the manufacturer's antenna installation manual for instructions on how to install the antenna. See the *About* section for a list of antenna installation manuals. Follow all safety procedures. Cable requirements are on page 4.

CAUTION

A password from the authorized installer is required before the National Operations Center will activate the system.

⚠ CAUTION

Professional installation and service of the antenna assembly is required by the Federal Communications Commission because the radio transmits radio frequency energy.
- **The two-way antenna assembly must be installed in a location or manner not readily accessible to children.**
- **The two-way antenna assembly must be installed at least 5 feet (1.5 meters) above ground level or any nearby surface on which a person could sit or stand.**

⚠ CAUTION

- **The two-way satellite dish assembly emits radio frequency energy when in the transmit mode.**
- **Unplug indoor power connection before performing maintenance or adding upgrades to any satellite dish components.**
- **To avoid risk of injury, do not place head or other body parts between feed horn and reflector when system is operational.**

Prohibited area
(when operational)
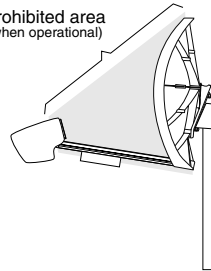
Installing DIRECWAY installation software on installer laptop

The installation software for the DW4020 is on a CD. The software will enable you to register DW4020 customers. You need a receive modem (IRU) to install the software on your installer laptop PC.

Do not confuse the installation software with the software that is downloaded to the Gateway via satellite during registration. The DW4020 installation software enables you to register customers and configure the DW4020 for operation. The software that actually operates the DW4020 is downloaded during registration.

It is important to understand that there are three service options: consumer, small office/home office, and enterprise. Each option has its own registration server that appears in the Websetup Welcome screen when you start Websetup to register a customer. You must be careful to choose the correct option. If in doubt consult the work order.

For example, if you are installing a DW4020 for a SOHO customer, you would double-click on the registration server for a SOHO installation. If you click on one of the other servers, you will not be able to install the customer correctly.

Installing the software Do not connect USB cable to the receive modem until prompted. You may use the cable that came with the unit, or a different cable if you need a longer one.

1. Load the installer software CD into your laptop computer. The installation wizard should appear. If it does not, select *Start→Run*, browse to the CD drive, select it, and select **setup.exe**.

Figure 3: Installation screen

2. Select **Install Software.** A Setup screen appears.
3. Select **Next**. An Agreement screen appears.
4. Select **Yes**. The Device Install Status screen in Figure 4 appears.
5. Connect the USB cable. The installation will complete and the Websetup Welcome screen appear. See Figure 5. If you are prompted for the location of your Windows *.cab* files, enter the location or insert your Windows installation CD, load the files, and re-insert the DIRECWAY installation CD. If you continue to see the Device Install Status screen, try the following:

   – Unplug the USB cable and plug it in again.
   – Verify you are using the correct power supply.
   – Try a different cable.
   – Troubleshoot your USB port.
   – Try a different receive modem.
6. Select **Exit**.

Note: If you are using Windows XP as the installer laptop operating system, the laptop may reboot after you attach the USB cable. If this occurs, unplug the USB cable and repeat the installation process after the laptop reboots.
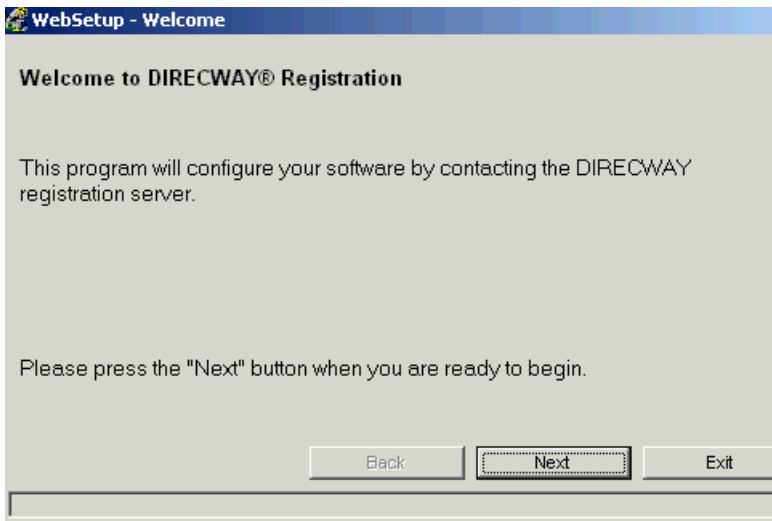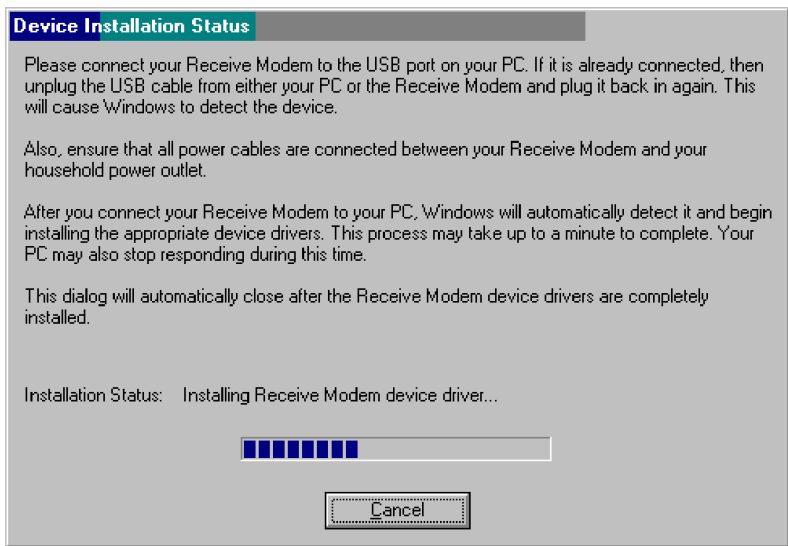
Figure 5: Websetup Welcome screen

Installing the system using a modem

You need all the items shown in Figure 6. Some of them are in the modem installation kit or inside the antenna box.

If you are using Web commissioning, you must provide an Ethernet cable to connect between the DW4020 and installer PC.

If Web commissioning is not available, you must provide a 9-pin female/female (F/F) null modem serial cable. The serial cable can be used to configure the DW4020 via the serial port. Appendix C – *Installing the DW4020 Manually,* on page 77.

You will also need the installation work order. This is provided to you by HNS.

Note: At some installation sites, the USB cable that comes with the DW4020 may not be long enough to reach from the installer PC to the DW4020. You may need a long USB cable.

Read this manual and obtain serial cable and installation work order

This manual

9-pin F-F serial cable

Install Spec

Installation manual

Ethernet cable

Install specification

These items are packaged in a small box inside your antenna box

Receive modem

Clips

Transmit modem

Gateway

AC cord

25-pin connector cable

USB cable

DC cord

Power adapter

Power supply 1031105-0001

Figure 6: Items required for installation

The power supply The DW4020 uses a power supply with the part number P/N: 1031105-0001. The part number is on a sticker on the power supply. Verify that you are using the correct power supply. Do not use anything but the power supply supplied with the DW4020 system (1031105-0001).

Be sure the power supply is labeled **ADP 64AB B** in the upper right hand corner of the label, above the bar codes. See Figure 7.

CAUTION

- **This unit's performance may suffer if the wrong power supply is used.**
- **This unit must be used with the power supply PN 1031105-0001.**
- **When power needs to be removed from the receive modem, ALWAYS unplug the AC power cord from either the wall outlet, surge protector, or power strip.**
- **NEVER pull the power cord from the back of the receive modem. Doing so could damage the pins and also cause a short in the system.**
- **Power supply with the part number 1031105-0001 is to be used only in the United States and Canada.**
- **This unit must be used with 110-volt AC input.**
- **Other countries may have different standards and requirements.**

PN: 1031105-0001   ADP-64AB B
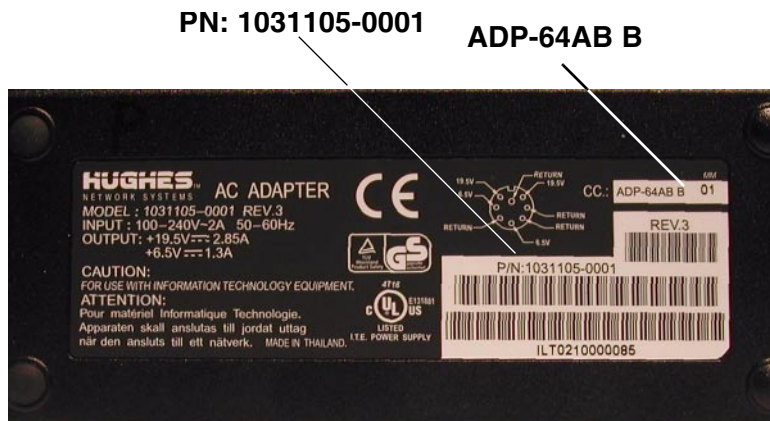
Figure 7: ADP-64AB B above bar code

Assembling the components, modem installation method

Follow the steps below and refer to the illustrations on page 13 through page 16 to assemble the DW4020 components. Note that some cables are connected to the installer laptop until commissioning is complete. Then the DW4020 is connected to the customer's computer.

Before beginning the installation, be sure that you have installed the installation software correctly. See *Installing the software* on page 9. In addition, confirm that DHCP is enabled to accept IP addresses automatically on your installer laptop PC. See Appendix D – *on page 113*.

CAUTION

- **The components must be stacked in this order: Gateway on bottom; transmit modem on top of Gateway; receive modem on top of transmit modem. See Figure 10.**
- **If the components are not stacked in the proper order, the receive modem may overheat and malfunction.**
- **Do not block any ventilation openings. Do not install near any heat sources such as radiators, heat registers, ovens, stoves, or other apparatus (including amplifiers) that produce heat.**
- **Recommended ventilation space around the top and sides of the DW4020 assembly should be approximately 6 inches. Ventilation is necessary to avoid overheating.**

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1. Be sure the power supply is not plugged into a wall outlet, surge protector, or power strip.
2. Lay two of the four clips on a table and mount the components as shown in Figure 8. Mount the Gateway first, then the transmit modem, then the receive modem.
3. Turn the component stack right side up and install the other two clips as shown in Figure 9.

   Note: The Gateway and the transmit modem have a hole at the center of each of their four feet. There is a tab on the bottom of each mounting clip, which snaps into place on the Gateway when properly aligned over the hole.There is also a tab in the middle of each mounting clip, which snaps into place on the transmit modem when properly aligned over the hole.

4. Double-check that the components are installed in this order from top to bottom: receive modem, transmit modem, Gateway. See Figure 10.

Figure 8: Mount the components on two clips

Figure 9: Attach the other clips

Receive modem

Transmit modem

Gateway
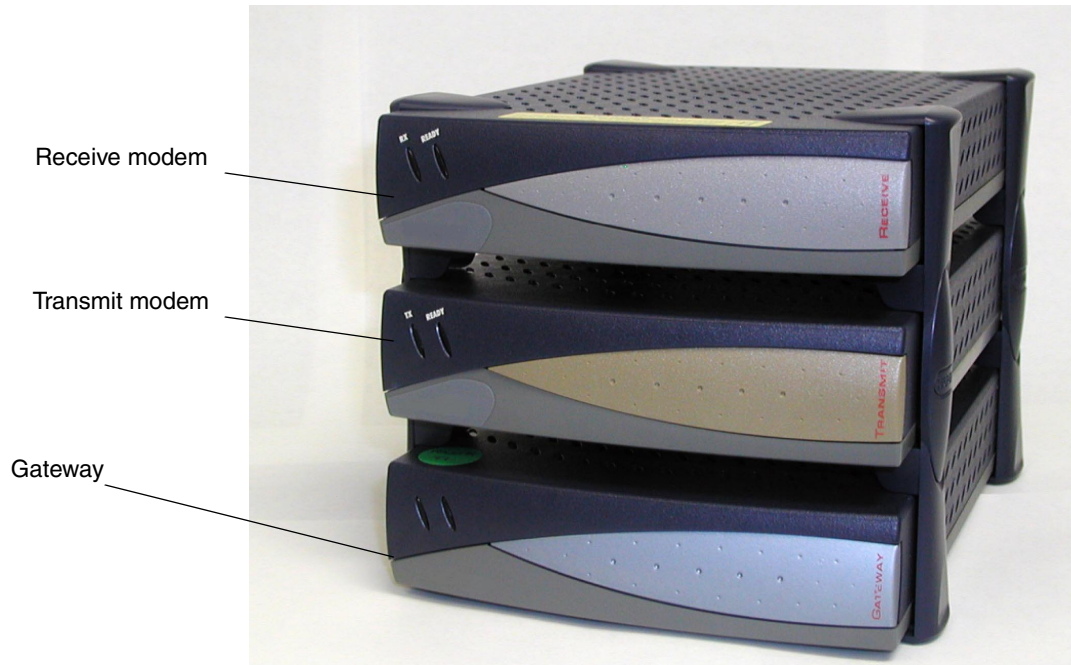
Figure 10: Component stack

5. Connect the component interconnection cables. See Figure 11. A USB cable connects the receive modem and the installer PC; you may use a longer cable rather than the one that is supplied if you wish. An Ethernet cable connects the Gateway and the installer PC. A 25-pin connector cable connects the transmit and receive modems. A power supply adapter cable provides power to the Gateway and receive modem. See Figure 11.
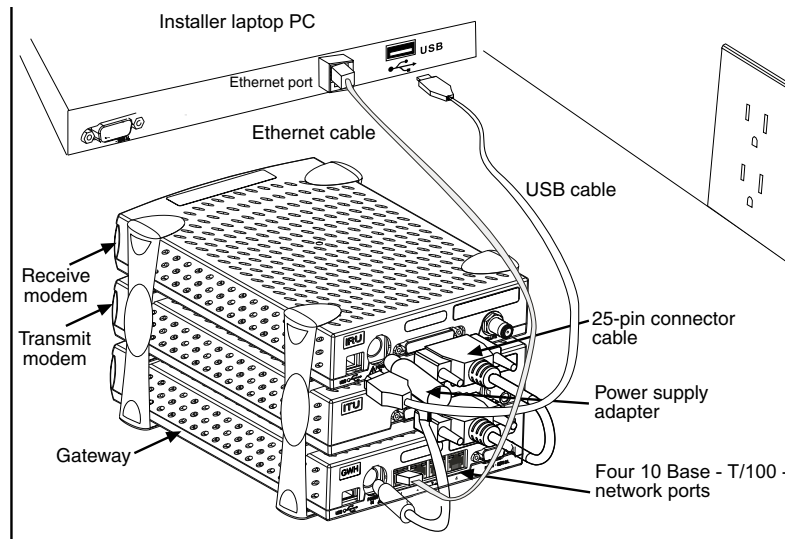
Figure 11: Attach interconnection cables

6. Attach the power supply cords to the power supply and to the power adapter. Ensure that the power cord is tightly connected to the power supply, receive modem, and Gateway. See Figure 12.
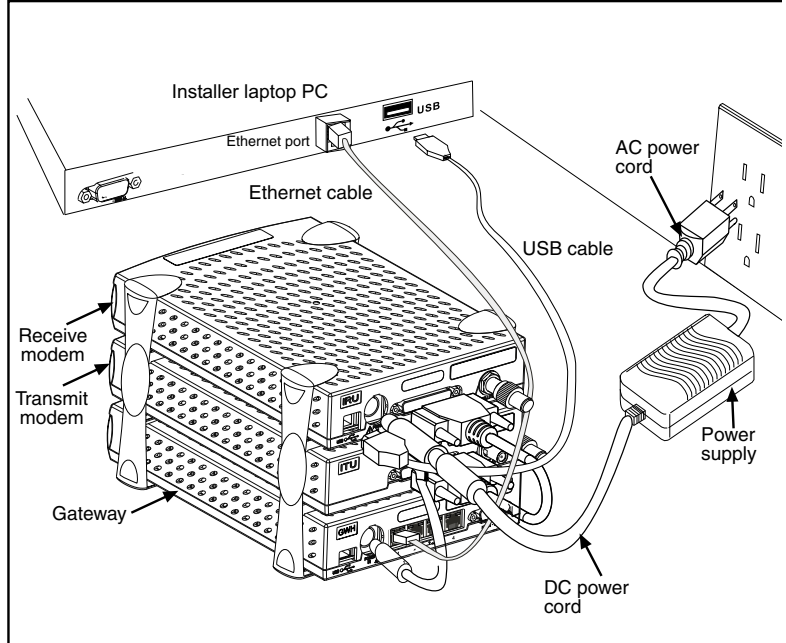
Figure 12: Connect power cord

Connect Ethernet, power up, and read the Gateway LED display

After you assemble the DW4020, connect it to the installer laptop with Ethernet cable. Plug it into a 110 V wall outlet, power strip, or surge protector. The Gateway LED display will cycle. The cycle completes in less than a minute and follows this sequence:

- Gateway STATUS LED is red until the power-on self-tests are completed.
- Gateway READY LED blinks green because it is not yet commissioned.
- Gateway STATUS LED blinks orange as it is not attached to the receive modem.

Note: In countries outside North America, the DW4020 may be plugged, with a physical adapter, directly into a 220 V outlet. Different countries may have different standards and requirements.

Note: Whenever the LEDs do not function properly as described below, check to be sure you have the correct power supply, PN 1031105-0001.

The transmit and receive modems have their own LEDs, which show their status. These are described in *The modems' LEDs* on page 18.

For more information on LEDs, troubleshooting, and LED blinking and status codes, see Chapter 4 – *DW4020 LEDs and troubleshooting,* on page 53.

Note that normal Gateway operation alone doesn't imply normal *DW4020* operation. The installation and commissioning process may not have been completed or software download (DLL) from the Network Operations Center (NOC) may not have been completed. Additional status information is available via the User Interface. See Chapter 3 – *The User Interface,* on page 33) and the LEDs on the receive and transmit modems. *The modems' LEDs*.

Table 4: Gateway LED display

LED condition	STATUS LED	READY LED
Off	Power off	Power off or startup diagnostics not yet run successfully
Steady Green	Normal operation	Running software downloaded from NOC; successfully commissioned
Blinking Orange	Contact between GWH and IRU over USB not established; USB cable not installed or some other USB problem	Not applicable
Blinking Green	Not applicable	Not commissioned
Steady Red	Power on tests	Not applicable

Obtain IP address and test Ethernet connection

1. Restart the PC so that the Gateway assigns it an IP address. Or use the command `ipconfig /renew` from a DOS command line prompt.
2. The embedded DHCP server assigns IP address = 192.168.0.2 to the PC. The DW4020 Address is set to 192.168.0.1.
3. Make sure the PC can communicate with the DW4020 over the Ethernet connection. Enter `Ping <192.168.0.1>` at a DOS prompt.

The modems' LEDs The receive and transmit modems have LEDs on their front panels. Both modems have a green **READY** LED. The receive modem has a green **RX** LED. The transmit modem has a green

TX LED. The LEDs' status indicate various conditions. Table 5 describes the basic states.

The LEDs may also indicate various conditions through *blink patterns.* The numbers in brackets are the status codes discussed in *The System Status indicator* on page 36.

If the modem does not appear to be functioning, check all cable connections. If they are secure, cycle the power by unplugging the power cord at the power supply and plugging it back in. A number of conditions and corrective actions are described in Chapter 4 – *DW4020 LEDs and troubleshooting,* on page 53.

The **READY** LEDs should come on steady when the DW4020 is powered up, commissioned, and when it is operating. The **TX** and **RX** lights can also blink when the DW4020 is first powered up, or when the DW4020 is power cycled. However, that blinking does not indicate anything about their status.

Table 5: Basic Receive and Transmit Modem LED States

	Ready OFF/RX OFF	Ready ON/RX Off	Ready ON/RX blinking
Receive modem	Modem not functioning	Modem functioning, no data being received	Modem functioning, data being received
	Ready OFF/TX OFF	**Ready ON/TX Off**	**Ready ON/TX blinking**
Transmit modem	Modem not functioning	Modem functioning, no data being transmitted	Modem functioning, data being transmitted

The DW4020 is extremely reliable. If you find you cannot surf the Internet or the DW4020 seems to have a problem, follow this sequence of steps below to identify and fix the problem.

- *Check whether the DW4020 LEDs are on or off.* The LEDs may indicate that a connection has become loose. Reconnecting a cable or power cord may restore function.
- *Check if the LEDs are blinking in a pattern.* The LEDs can blink in a pattern. The patterns correspond to the receive and transmit status codes discussed in *Transmit Status messages* on page 37 and *Receive Status messages* on page 42. See *LED blinking indicating status codes* on page 60 for a discussion of the blinking LEDs.
- *Check if the LEDs on the back of the Gateway or on or off.* The LAN ports on the back of the Gateway have LEDs. See *Ethernet port LEDs* on page 20.
- *Contact technical support.* If the corrective actions described in this chapter and *Chapter 3 – The User Interface* do not solve the problem, contact technical support.

Ethernet port LEDs   Each of the four Ethernet ports on the DW4020 has two LEDs associated with it. One LED is green and one is yellow. See Figure 13.

The green LED will be on if power is applied to the DW4020 and a 100baseT Ethernet device is connected to the corresponding Ethernet port. Otherwise, the green LED will be off.

If the power is on and the light is off while a network device is connected, then the device is a 10baseT device and the port is autosensing.

The yellow LED will also be on when power is applied to the DW4020. It will flash momentarily when there is LAN activity on the corresponding Ethernet port.

Figure 13: Ethernet port LEDs

Running the DW4020 installation software, commissioning, and registering the customer

The DW4020 installer's computer software is basically DIRECWAY 4.0 software with some functions, such as interacting with a browser, removed. It is used to run Websetup and commission the customer.

There are three registration servers, one each for consumer, small office/home office, and enterprise. Before you select the registration server, check the work order and confirm which service option the customer has chosen.

You will connect the installer laptop and receive modem, register the customer, peak the satellite signal, connect the customer's DW4020, and confirm that they can surf the Internet.

1. Connect the receive modem to the installer laptop PC with the USB cable.
2. Connect the installer laptop PC to an analog telephone line or alternate connection to the Internet.
3. Select *Start→Programs→Direcway Installer→Websetup*. The Welcome screen appears. Check the work order for the service option and highlight the proper registration server. The select **Next.** Follow the instructions on subsequent screens; the instructions below will supplement the onscreen instructions.

   If the Welcome screen does not appear, the receive modem is not connected to the PC or there is a problem with the receive modem installation. Check cable connections. If cable connections are not the problem, restart the PC. If that does not solve the problem, call technical support.

Figure 14: Welcome screen; choose proper registration server

4. Websetup will first detect the Gateway and the modem. See Figure 15.
5. Then Websetup will check for an existing connection to WebACS. Websetup may bring up a dial-up connection if necessary. See Figure 16.
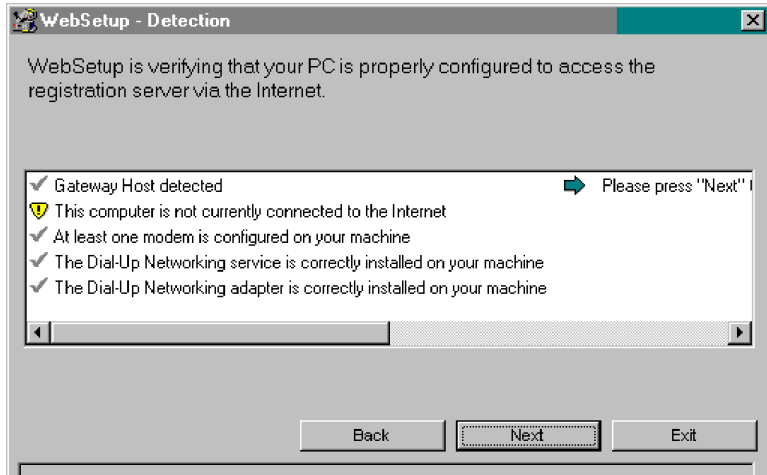
Figure 15: Websetup - Detection

Figure 16: Dial up connection may be necessary
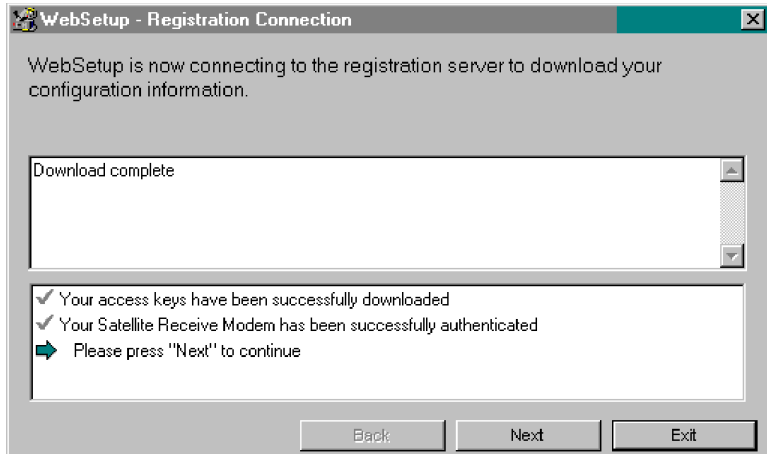
Figure 17: Registration Connection - Authentication

6. Websetup will then authenticate the receive modem serial number and enable it. See Figure 17.

7. Websetup then presents a series of forms to the user to complete registration. See Figure 18 through Figure 20. The appearance of the forms may vary, and the forms' content may change from time to time. For example, a SOHO customer Service Offerings screen shown in Figure 19will be different from a consumer screen.

Figure 18: Agreement

Figure 19: Service Offerings

Figure 20: Registration

✍   **Note: The registration information in Figure 20 is very important. Make certain this information is recorded on the cover of the customer's User Guide. That way the customer will have important information available should their DW4020 not function and they need to call technical support.**

8. After the customer enters registration information, write the information in Figure 20 on the cover of their User Guide.

9. Select Continue in the Registration screen in Figure 20. The Antenna Pointing - Antenna Location screen appears. See Figure 21.
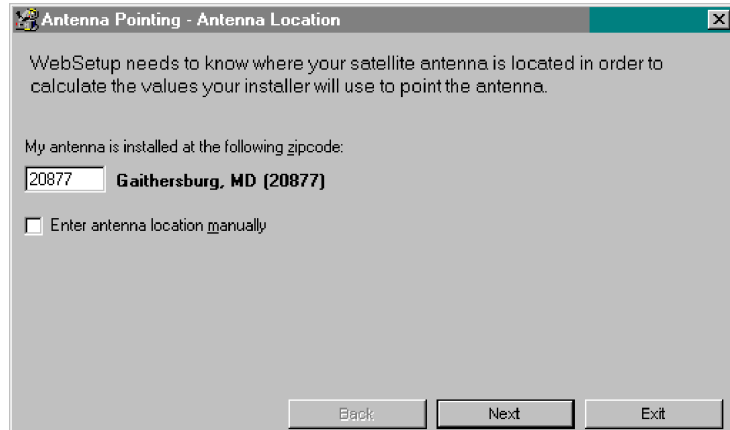
Figure 21: Enter ZIP code

10. Verify that the ZIP code shown matches the ZIP code for the installation site. If not, correct it. Select **Next**. The Antenna Pointing - Receiver screen appears. See Figure 22. At this point it shows no signal strength or auto cross-pol checkbox.

11. Click through all pointing screens by selecting **Next**. Click through until you reach the Websetup - Finish screen. You will finish registration before peaking the signal.

Note: You must not disconnect the power cables before completing Step 13. Finish registration before peaking the signal.

12. When the Websetup-Finish screen appears, Websetup receives a parameter file from the WebACS and transfers it to the DW4020 over the Ethernet connection. If it is successful, a message appears asking you to press **Finish**. See Figure 23.

13. Select **Finish.** The unit is commissioned. A message may appear telling you to connect and reconnect the USB cable. Click **OK**. You do not need to do anything with the USB cable at this time.
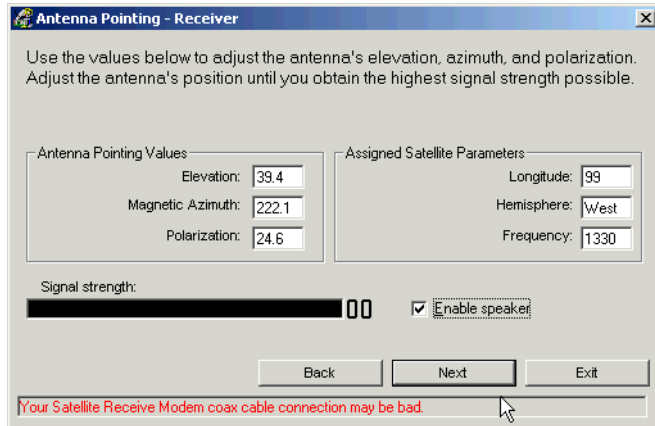
Figure 22: Antenna Pointing - Receiver
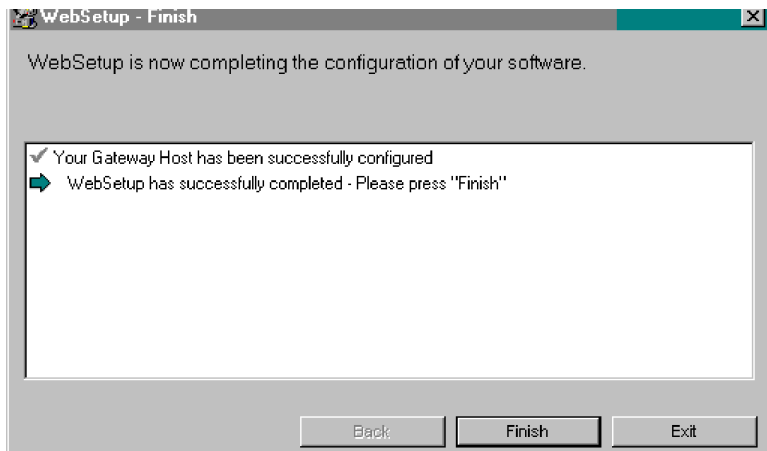
Figure 23: Finish

Figure 24:

Post-commissioning

In post-commissioning, you peak the satellite signal, attach the DW4020 to the customer computer that has a functioning Ethernet interface, and confirm the customer can surf the Internet.

Peak the satellite signal

1. Unplug the DW4020 power cord from the wall outlet or surge protector.
2. Remove the phone line and network cable from the installer laptop PC.
3. Remove the network cable from the Gateway and unplug the USB cable from the receive modem.
4. Connect a long USB cable from the back of the receive modem to the installer laptop PC.
5. Assemble and install the satellite antenna.
6. Place the outdoor pointing interface (OPI) in the receive cable line if applicable.
7. Power on the DW4020. Select *Start→Programs→DIRECWAY Installer→Antenna Pointing.* The Antenna Pointing - Antenna Location screen appears. See Figure 25.
8. Verify the ZIP code matches the antenna location and select **Next**. The *Antenna Pointing - Receiver* screen appears. Check the Longitude, Hemisphere, and Frequency values. See Figure 26.
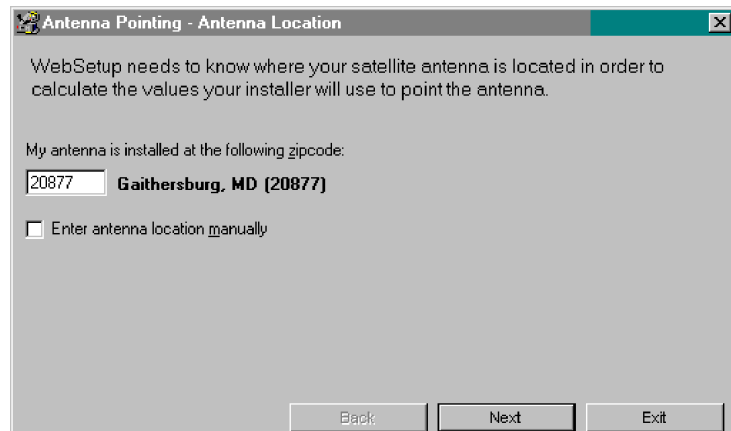
Figure 25: Antenna Location; verify ZIP code
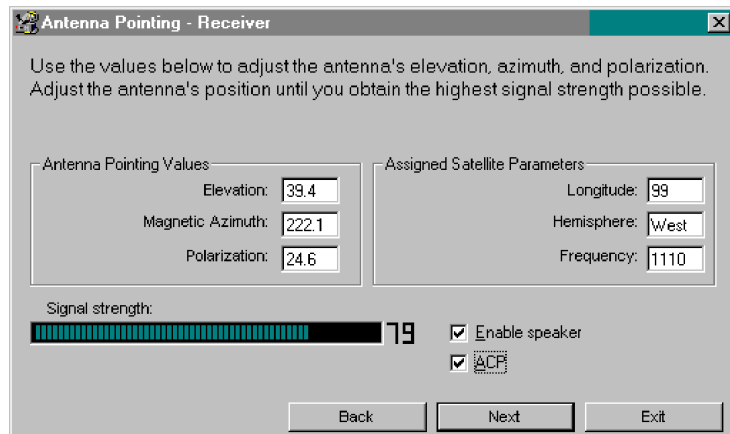
Figure 26: Antenna Pointing - Receiver

9. Use the Elevation, Azimuth and Polarization values to adjust the antenna to achieve maximum receive signal strength.

10. Select the ACP (auto cross-pol) checkbox. If it is not available, wait five minutes; the system will update.

11. Select **Next** to go to the Antenna Pointing - Transmitter screen. See Figure 27.
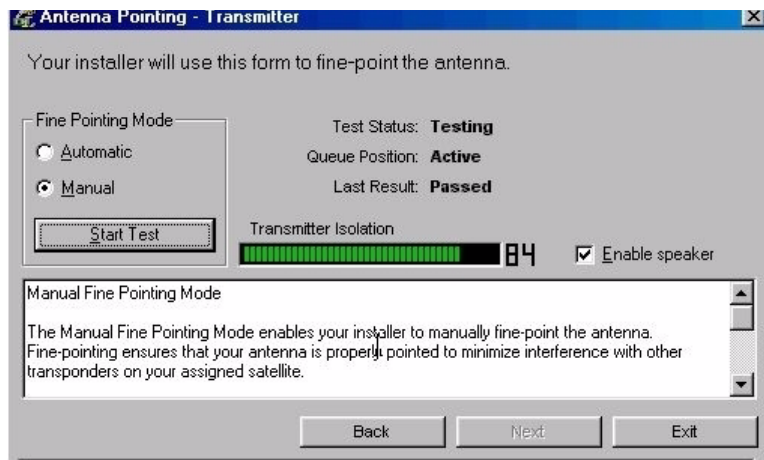
Figure 27: Start manual cross-pol; pass and peak isolation

12. Select the Manual fine pointing mode radio button.
13. Select **Start Test**. Adjust the antenna to achieve maximum transmit isolation.
14. When the unit consistently passes the manual transmit test, bolt the antenna securely before going to Step 15.
15. After the antenna is bolted, select Stop Test. See Figure 28.
16. Then select the Automatic radio button and select **Start Test** to start the automatic ACP test. See Figure 29.
17. Make sure the test passes.
18. Select **Exit** after passing the test.
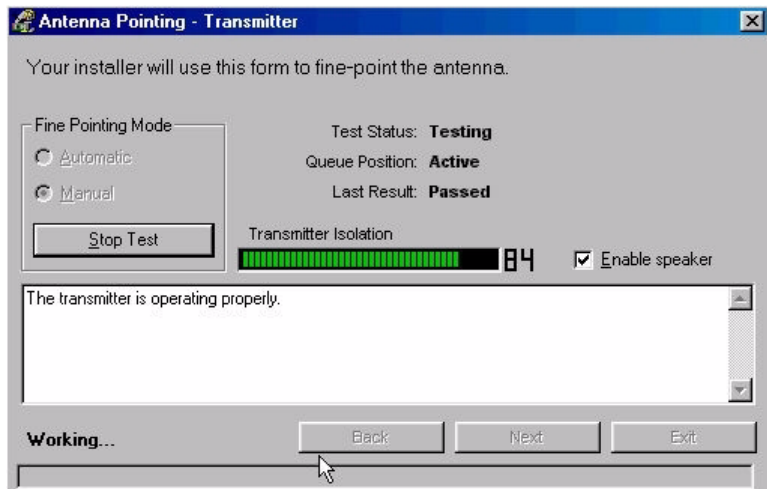
Figure 28: Manual cross-pol passed; select Stop Test
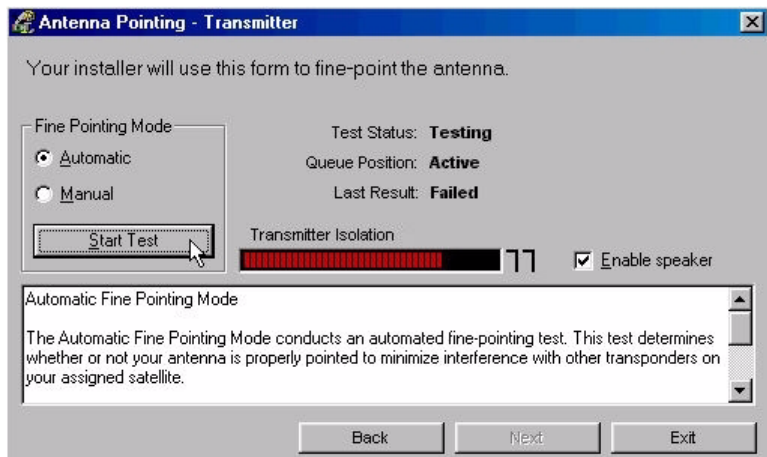
Figure 29: Auto cross-pol
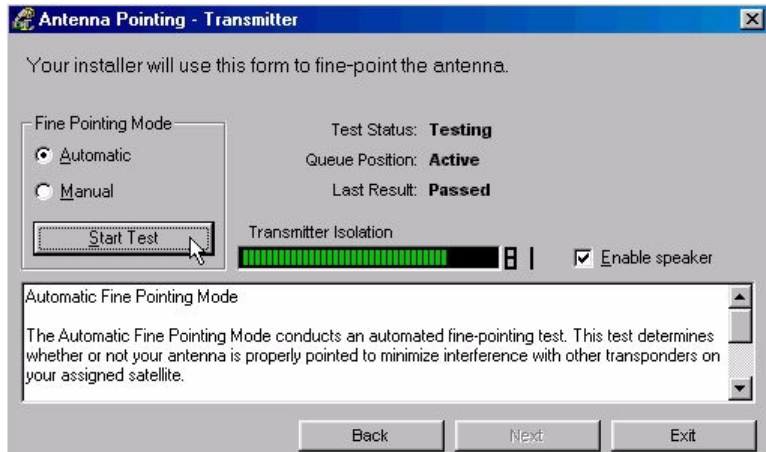
Figure 30: ACP passes; select Exit

Connect to customer computer and confirm surfing

1. Disconnect the USB cable from the installer's PC.
2. Connect the receive modem to the Gateway using the USB cable supplied with the unit. See Figure 31. The DW4020 will re-initialize and come back up in normal mode.
3. Connect the receive coaxial cable to the receive modem and the transmit coaxial cable to the transmit modem. See Figure 31.
4. Plug the power cord into the wall outlet or surge protector.
5. Make sure that the READY LEDs on all three units are STEADY GREEN. Make sure the transmit and receive cables are clearly labeled at the connectors.
6. The DW4020 is now commissioned. Connect the customer's computer and the Gateway with Ethernet cable. See Figure 31. If the computer has a functioning and properly configured Ethernet interface, it will surf the Internet. If the customer cannot surf, see the instructions below.

If the customer cannot surf   If the customer cannot surf, configure your installer laptop so its network properties match the customer's. Refer to *Appendix D* for exact instructions for setting your network properties. Then:

1. Start a Web browser on the installer laptop.
2. Enter the Gateway IP address in the browser URL location bar and press Enter. If the DW4020 is functioning, the User Interface appears.
3. Enter an URL for a known Web site, such as abc.com or cnn.com. If it appears, the DW4020 is functioning and any problem exists on the customers computer. The customer's network properties may not be configured properly, or there may be some other system problem. They should consult the User Guide for support information.
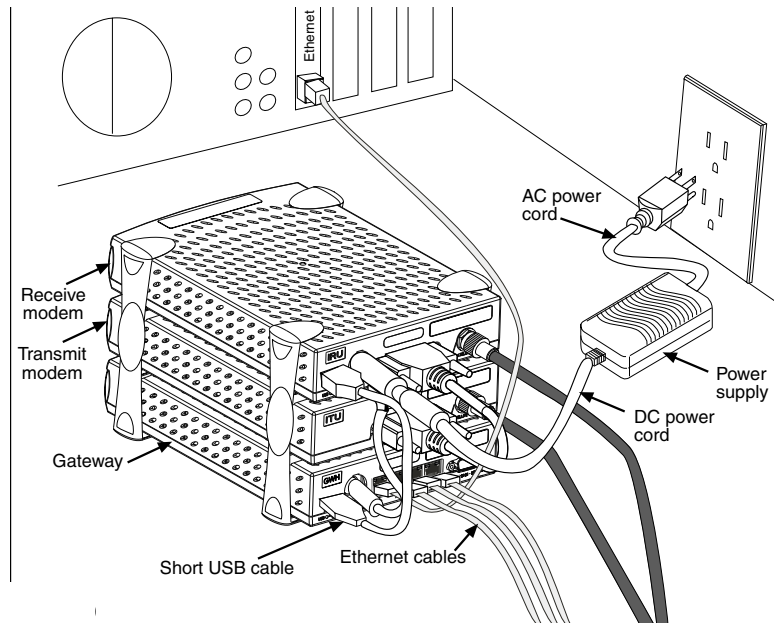
Figure 31: Final cabling

Chapter 3
The User Interface

In the Version 1.0 software, DW4020 status information was available on menus accessed through the serial port via Hyperterminal. In the Version 2.0 software, a browser-based User Interface provides information about system status, system configuration, online documentation, and firewall configuration. Access it if the DW4020 doesn't seem to be functioning properly, to find system information for configuring networks, or to check system performance. Clicking on items highlighted in *blue* displays help information or other documentation.

Note: The information about the DW4020 User Interface in this manual is the same as that in the ***DW4020 User Guide*** (HNS 1032564-0001 Rev A). Each DW4020's software is updated periodically via satellite link. The updates should be reflected in User Interface Help if they are not documented in the User Guide or in this manual. Always refer to User Interface Help and the latest revision of the User Guide, as well as this manual, for the latest information about the User Interface and DW4020 software.

If at any time you are unable to access the User Interface, take the steps below:

- Make sure the Gateway is powered up. The STATUS and READY LEDs should be lit continuously. If they are not, power cycle the DW4020 by unplugging the power cord from the wall outlet or surge protector, waiting 10 seconds, and plugging it back in. Refer to the Chapter 5 Troubleshooting for more information.
- If the User Interface is still not accessible, check the Ethernet cable connection from the computer to the DW4020. Check that the power adapter is securely attached to the receive modem and Gateway. Also check the computer's network configuration.
- If the User Interface is still not available, contact technical support.

How to access the User Interface

The User Interface is accessed through any browser, such as Internet Explorer or Netscape. Follow the steps below to set up an entry for the User Interface in a browser. The steps are written for Internet Explorer or Netscape, but you can use a similar procedure for any browser.

1. Go to *Start→Programs→Internet Explorer* (or Netscape). The browser interface appears.
2. Place the cursor in the Internet Explorer Address bar or the Netscape Location Bar.
3. Type the DW4020 IP Gateway address. The should have been written this on the front of this manual when the installer finished configuring the unit.
4. Press **ENTER.** The User Interface **Home** screen appears. See Figure 32. .
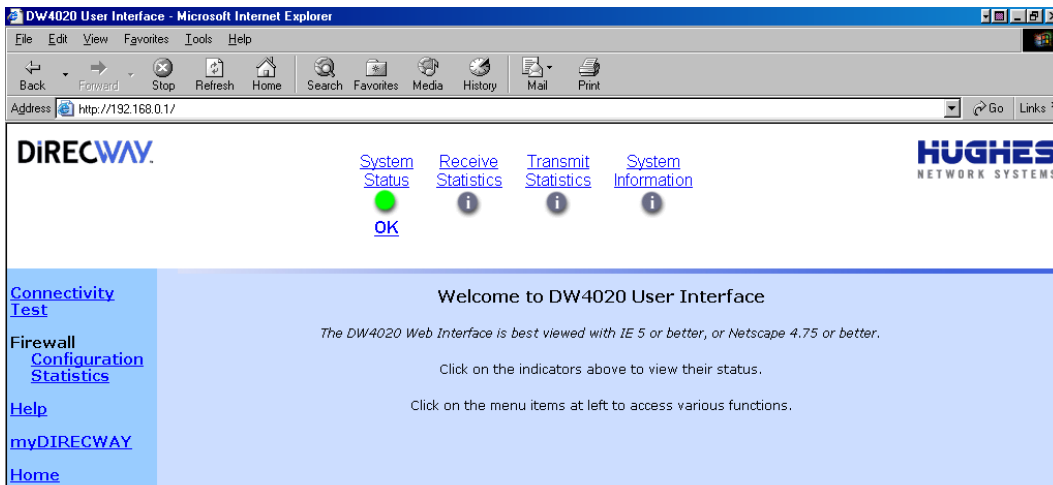
Figure 32: The User Interface Home screen

The Home screen

The Home screen has system indicators across the top. There are menu items in a column along the left. The system indicators consist of the following:

- System Status reports the strength of the receive signal, the status of the receive and transmit modems, and software download status. If System Status is colored *green*, the DW4020 is functioning properly. If there is a problem, it is colored *red* and the word "PROBLEM" appears below System Status. See Figure 33.
- Receive Statistics reports data on receive modem functioning.
- Transmit Statistics reports data on transmit modem functioning.
- System Information provides information such as the Gateway IP address, subnet mask, site ID, and what features are enabled.
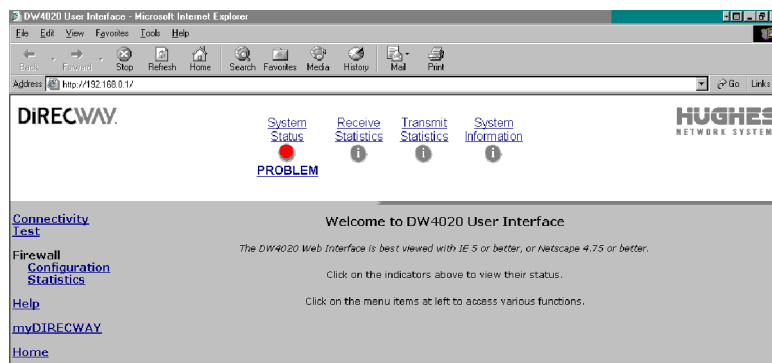
Figure 33: System Status reports PROBLEM

The System Status indicator

Clicking on **System Status** will display a *System Status* screen. See Figure 34.
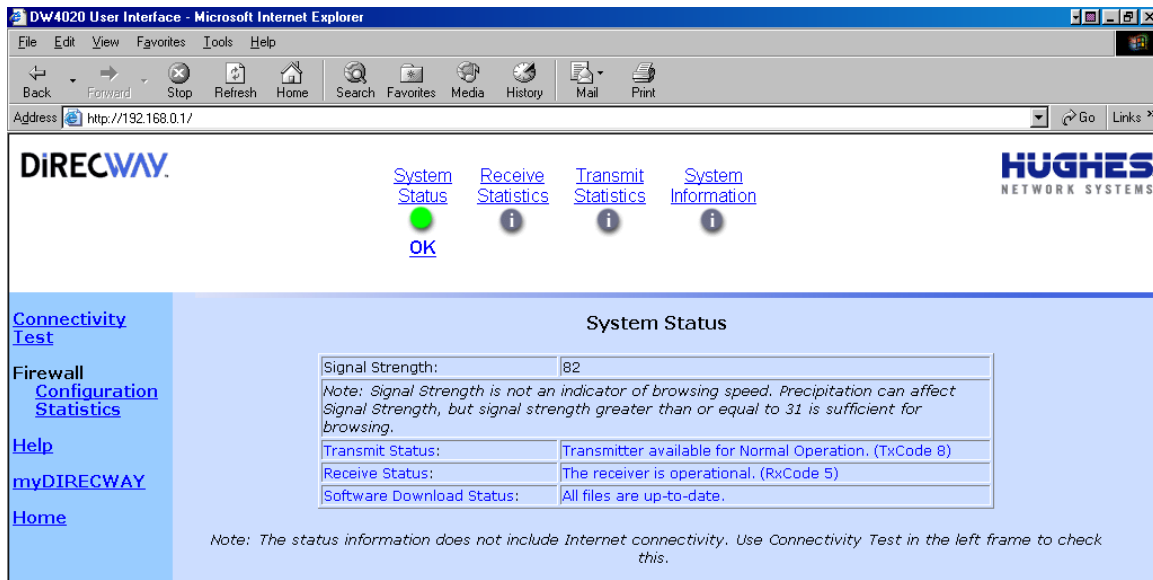
Figure 34: System Status screen

The screen consists of the following fields.

- Signal Strength - indicates the signal quality factor (SQF), which is the strength of the receive signal. If SQF is 30 or below, the antenna must be repointed by a certified professional installer.
- Transmit Status - indicates the status of the transmit modem.
- Receive Status - indicates the status of the receive modem.
- Software Download Status - indicates the status of the downloading of software from the Network Operations Center (NOC). If the DW4020 has been commissioned, this message will generally indicate that software download has been completed. Occasional updates are automatically downloaded to the DW4020 from the NOC. The purpose of these updates is to enhance DW4020 performance. Remember that this software is not placed on the customer's computer, but on the DW4020. No action is required from them. The software version number in the System Information page indicates the current version of the downloaded software. See *System Information* on page 45.

If there is a problem with any of these four status elements, a red exclamation mark will appear in the status field. In addition, if there is a problem with the Transmit Status or Receive Status, an error message and an error code will appear in blue. You can click on the error message and an explanation of the error condition and what action might solve it will appear. See Figure 35. The tables below provide a more detailed explanation of status codes, error messages, and corrective actions.
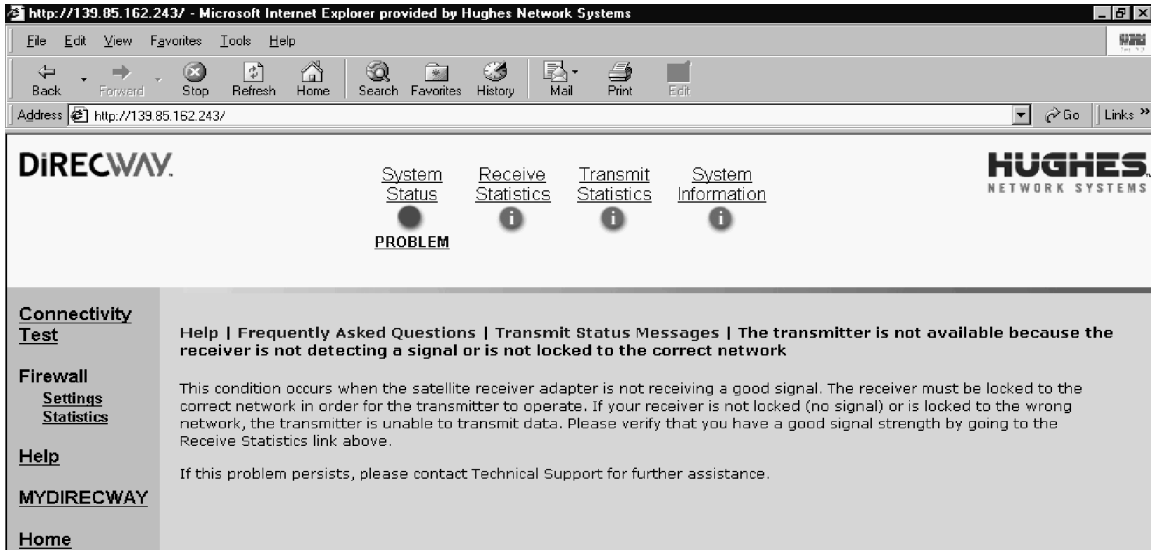
Figure 35: On-line help for status messages

Transmit Status messages The following messages may appear in the Transmit Status field. The Comments section gives more information about each code, and describes any possible corrective measures. See Figure 36 on page 41 for corrective measure involving cables or the power supply. *Power cycling* means to unplug the power cord from the wall outlet or surge protector, wait 10 seconds, and plug it back in.

If corrective measures do not solve a problem, contact technical support.

TxCode 8 means the transmit modem is working properly. It is the code you will see most of the time.

Note: Remember that IRU refers to the receive modem, and that ITU refers to the transmit modem.

Table 6: Transmit status (TxCode) messages and corrective actions

Numeric TxCode	Message Displayed	Comments
0	The transmitter is not connected to the receiver	This status will occur only if the Indoor Transmit Unit (ITU) is not connected to the Indoor Receive Unit (IRU). It can result for the following reasons: • The 25-pin parallel cable is not properly connected to the Indoor Receive Unit or Indoor Transmit Unit: Check the cable and make sure the ends are securely fastened. • Indoor Transmit Unit failure. The Indoor Transmit Unit has failed and may need to be replaced.
1	The transmitter has been disabled by the Network Operations Center	This condition occurs when the transmitter is not enabled. A transmitter may be disabled for short periods of time by the NOC for service or troubleshooting. It may also be disabled if the user discontinues the satellite service. If this condition persists, it can only be corrected by requesting that the unit be enabled.
2	The transmitter has been placed in test mode by the Network Operations Center	This status requires no user action and this test usually completes in 15 minutes or less. This condition occurs when the NOC places the transmitter into special transmission modes to measure the performance of the transmitter. When in this mode, the unit is unable to transmit normal user data to the NOC.
3	The transmitter is locking to the receive carrier	This condition occurs during initial startup or when the receiver is locking to the receive signal. It is normal for this condition to persist for up to 10 seconds. If this condition persists for more than 10 seconds, try disconnecting and reconnecting the receiver coaxial cable and wait 10 seconds. If the situation still persists, then the Indoor Transmit Unit may need to be replaced.
4	The transmitter is not responding to commands sent from the receiver	This condition indicates that something is not operating properly in the Receive/Transmit Unit configuration. Perform the following actions to attempt to recover from this condition: • Verify that the Indoor Receive and Transmit Units are securely connected with a 25-pin parallel cable. • Reset the IRU by unplugging the IRU power cord from the wall socket and then plugging the power cord back into the wall socket. This will reset the Indoor Receive and Transmit Units. This condition could also be caused if the power supply is faulty. If this condition cannot be resolved by following the steps listed above, then you may need to replace the power supply, the Receive/Transmit unit cable and/or the Transmit Unit.

Table 6: Transmit status (TxCode) messages and corrective actions

5	The transmitter is not locked to the network timing	No action is necessary if this condition occurs from time to time and quickly resolves itself. If this issue persists, it is likely due to a NOC-related service issue. The condition may also be due to Indoor Transmit Unit failure; in rare cases, the Transmit unit may fail and may have to be replaced.
6	The transmitter is not available because the receiver is not detecting a signal or is not locked to the correct network	Check your receive signal. This condition occurs when the Indoor Receive Unit is not receiving a good signal. The receiver must be locked to the correct network in order for the transmitter to operate. If the receiver is not locked (no signal) or is locked to the wrong network, the transmitter is unable to transmit data. Please verify that you have a good signal strength by going to the Receive Statistics page. This could also be caused by inclement weather.
7	The transmitter is not available because the satellite receiver is not tuned for normal operation	This condition occurs when the transmitter is disabled for safety reasons. If this happens during installation or commissioning, the installer will close the Antenna Pointing program and resolve the condition.
8	The transmitter is available	This is the normal operational state and indicates that the transmitter is ready to transmit data.
9	The transmitter is adjusting for optimal network timing	This condition typically occurs when the DW4020 is first commissioned or the first time it is used for data traffic. This must occur before the Indoor Transmit Unit is able to transmit successfully. Typically, this process usually takes less than a minute.
10	The transmitter is unable to communicate with the Network Operations Center	This condition indicates that the unit has stopped attempting to transmit user data because there were a number of failures in sending data to the NOC over the satellite link. This could be the result of weather conditions causing lost packets or return channel equipment failures in the NOC.
11	The transmitter is not available because the receiver software is out of date	This condition indicates that the installed software version is not recent enough to operate on the network. New software will be required from time to time due to network infrastructure and capability upgrades and in order to maintain network efficiency and fix any known problems.The system will automatically update the software version to ensure that you can enjoy uninterrupted operation. If you do not use the DW4020 for a long period of time and miss the updates, you may need to contact Customer Care.
12	The transmitter is not receiving network control messages from the Network Operations Center	This condition indicates a NOC equipment outage. This may be a transient condition and the system should recover automatically.
13	The transmitter is unable to range because it cannot communicate with the Network Operations Center	Ranging is the process that adjusts the satellite transmitter timing and power. The satellite transmitter conducts ranging as needed to ensure that it can communicate successfully with the Network Operations Center.This condition can indicate any of the following: • The NOC is not receiving ranging information from the transmitter. This may indicate a transmit problem at the NOC. This should get cleared in a few minutes. • The transmitter is unable to achieve enough transmit power to send ranging information to the NOC. Make sure that the power supply is correct. The power supply should be Part #1031105-0001. • The transmitter is sending incorrect timing data because the wrong zip code or latitude/longitude information was entered during installation. • The outdoor transmitter unit (ODU)--that is, the antenna--is not operating properly or is not properly connected to the ITU. Please ensure that the transmit cable is securely fastened to the Transmit Unit.

Table 6: Transmit status (TxCode) messages and corrective actions

14	The transmitter is not available because ranging has failed	This condition indicates that the transmitter is not operational because ranging has failed. Ranging is the process that adjusts the satellite transmitter timing and power. The satellite transmitter conducts ranging as needed to ensure that it can communicate successfully with the Network Operations Center. The ranging failure may happen due to the antenna becoming misaligned or if repeated attempts to range do not succeed. This condition may also be caused due to adverse weather conditions. In rare cases, this may also indicate NOC issues but should clear within a few minutes.If the system was operational in the past and you see these messages repeatedly, you can try to force range by performing the Connectivity Test.
15	The transmitter is waiting for a ranging request to be processed by the Network Operations Center	This condition occurs if the system is busy adjusting power and timing for other users. This process may take up to a minute or more.
16	The transmitter is waiting for a transmit request to be processed by the Network Operations Center	This condition occurs when the system is unable to provide transmit bandwidth. This occurs when many users sign-on simultaneously. It should clear in a few minutes automatically.
17	The satellite transmitter is unable to obtain an available transmission rate	This condition occurs if the transmitter cannot successfully range. Ranging is the process that adjusts the satellite transmitter timing and power. The satellite transmitter conducts ranging as needed to ensure that it can communicate successfully with the Network Operation Center. A possible cause is that the transmitter could not achieve enough power to transmit. This is likely caused because the antenna is not accurately pointed. However, it may also be a transmitter power problem. Check the power supply and make sure that it is Part # 1031105-0001.
18	The transmitter is requesting a transmit pointing test	This condition can occur during installation when the Antenna Pointing program on the installation computer requests that the transmitter perform a transmit pointing test. This condition persists until the NOC responds that the transmitter is either actively performing the pointing test or is queued to perform the test when test resources become available in the NOC. This is a normal condition for initial installation. The transmitter may also periodically go into this condition for short periods of time (less than 5 seconds) to perform periodic transmit pointing tests. These periodic tests are performed to ensure that the antenna is pointed accurately.
19	The transmitter is queued for a transmit pointing test	This condition can occur during installation when the Antenna Pointing software on the installation computer requests a transmit pointing test and the NOC has responded that the transmitter is queued for the next available test time. It may also occur when the transmitter is performing periodic background transmit pointing tests at the same time that other users on the network have requested tests. This is a normal state after initial installation.
20	The transmitter is performing a transmit pointing test	This condition occurs when one of the following tests are active: • During installation, the Antenna Pointing software requests that the transmitter perform a transmit pointing test. This condition will persist until the Antenna Pointing software exits from the transmit pointing test mode. • The DW4020 performs a periodic background transmit pointing test to make sure that the antenna is still pointed correctly. This periodic test takes less than 5 seconds. If the problem persists, try power-cycling the DW4020 by unplugging the wall outlet and plugging it back in.

Table 6: Transmit status (TxCode) messages and corrective actions

21	The transmitter is disabled because a transmit pointing test failed	This condition occurs when the transmitter fails a transmit pointing test. This indicates that the transmitter did not meet the minimum specifications required. This is likely due to an antenna installation problem. The antenna installer needs to fine-point the antenna. The transmitter will not transmit until the transmit pointing test passes.
22	The transmitter is disabled pending a transmit pointing test	This condition occurs when the transmitter is required to perform a periodic background transmit pointing test, but has not been able to perform the test within the time window required. The transmitter is expected to be in this condition for no more than two minutes at random periodic intervals. This condition can also occur after the transmitter is first powered on after it has been powered off for more than a day. If the unit remains in this condition for more than two minutes, then the automated transmit pointing components in the NOC are likely experiencing problems. This condition should clear in a few minutes.
23	The transmitter is disabled because a transmit pointing test cannot be performed	This condition occurs when the transmitter cannot perform the transmit pointing test when initially installed or when the transmitter is required to range. The condition indicates that the NOC components needed to perform the transmit pointing test are not operational.

T0091013
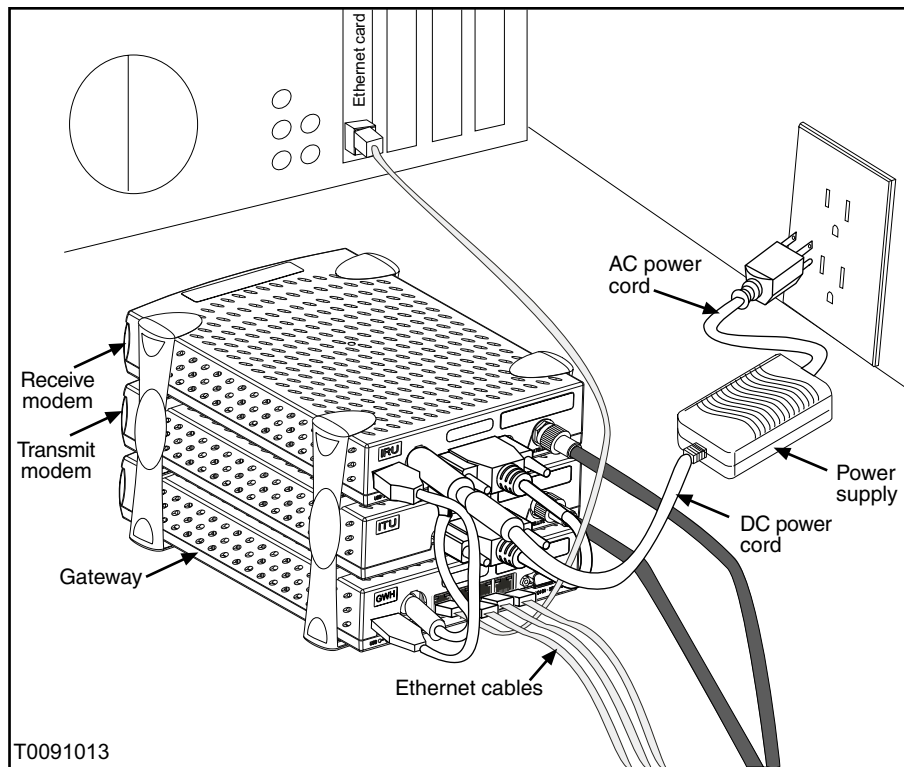
Figure 36: DW4020 connections

<table>
<tr><td colspan="1" align="center">CAUTION</td></tr>
</table>

CAUTION
Never unplug the power cord from the DW4020 while it is powered on. Always disconnect the power cord from the power supply, wall outlet, or surge protector.

Receive Status messages

The following messages may appear in the Receive Status field. The Comments section gives more information about each code, and describes any possible corrective measures. See Figure 36 on page 41 for corrective measure involving cables or the power supply. *Power cycling* means to unplug the power cord from the wall outlet or surge protector, wait 10 seconds, and plug it back in.

If corrective measures do not solve a problem, contact technical support.

RxCode 5 means the receive modem is working properly. It is the code you will see most of the time.

Note: Remember that IRU refers to the receive modem, and that ITU refers to the transmit modem.

Table 7: Receive code (RxCode) messages and corrective actions

Numeric RxCode	Message Displayed	Comments
0	The receiver is not connected	Please make sure that the Indoor Receive Unit is connected to the Gateway via the USB cable. If the cable is connected and you still see this message, use the following steps for troubleshooting: • Make sure the power supply is correct. The power supply should be Part # 1031105-0001. • Try power-cycling the DW4020 by unplugging the power cord from the wall outlet and then plugging it back in. • Try using a different USB cable. • If none of the above resolve the issue, you may need to replace the Indoor Receive Unit.
1	The receiver is in pointing mode	This condition indicates that the installer is performing antenna pointing. In this mode, the transmitter is disabled for safety reasons since the installer is working near the dish. If this occurs during normal operation, try power-cycling the DW4020 by unplugging the power cord from the wall outlet and then plugging it back in.
2	The receiver is in factory or NOC mode	This status is for DW4020 testing purposes only. You should never see it. If this occurs during normal operation, try power-cycling the DW4020 by unplugging the power cord from the wall outlet and then plugging it back in.

Table 7: Receive code (RxCode) messages and corrective actions

3	The receiver is not locked to a signal	If the DW4020 had been operating previously, this status is probably due to inclement weather conditions and will be corrected when the weather improves. This condition can also indicate that the IRU is unable to receive the signal from the NOC. This is also associated with a signal level less than 30. This occurs if there is a weather outage at the user location, a NOC outage due to inclement weather or other reasons, a misaligned or faulty antenna, or faulty cabling. If this keeps happening under normal weather conditions, make sure the power supply is correct. The power supply should be Part # 1031105-0001. If the power supply is correct, try power-cycling the DW4020 by unplugging the power cord from the wall outlet and then plugging it back in.
4	The receiver is locked to the wrong network	This condition should only be seen during installation and occurs when the receiver is locked to a signal, but the signal ID does not match the ID that was assigned to the user during commissioning or the ID that was entered by the installer during manual pointing. If this occurs during normal operation, it may be due to the user changing acquisition parameters, including frequency and/or location of satellite, or the antenna becoming misaligned.
5	The receiver is operational	This is the normal operating state where the receiver is receiving data from the NOC. Only when the receiver is in this state will the transmitter operate correctly.
6	The receiver is not detecting a signal	This condition occurs when the IRU is not detecting any type of radio signal from the antenna. This could indicate that the cabling between the receiver and the antenna is faulty or that the receiver itself is faulty. Check that the cables are firmly connected on the DW4020. Also, make sure that the power supply is correct. The power supply should be Part # 1031105-0001. Try power-cycling the DW4020 by unplugging the power cord from the wall outlet and then plugging it back in.
7	The receiver is locked to an unknown network	This condition should only be seen during installation and occurs when the receiver is locked to a signal but there is no DIRECWAY Network ID on that signal. If this occurs during pointing or commissioning, the antenna has not been pointed correctly. If it occurs during normal operation, it may be due to the user changing acquisition parameters, including frequency and/or location of satellite, or the antenna becoming misaligned. The former condition can be corrected by re-commissioning the site. The latter requires an antenna repointing.

Receive Statistics

The **Receive Statistics** screen contains information about how the receive modem is processing *frames*. It contains the following fields. See Figure 37.

- Receive Status - displays receive modem status messages. Click on Receive Status to view a list of receive status messages. Click on a receive status message to learn more about it.

- Frames Received - displays the number of frames the receive modem has received.
- Frames with Errors- displays the percentage of bad frames received.
- Bad Key Frames - packets received over satellite that could not be decrypted successfully. A non-zero value indicates commissioning problems. (Clicking on the field will display this definition in the Web interface.)
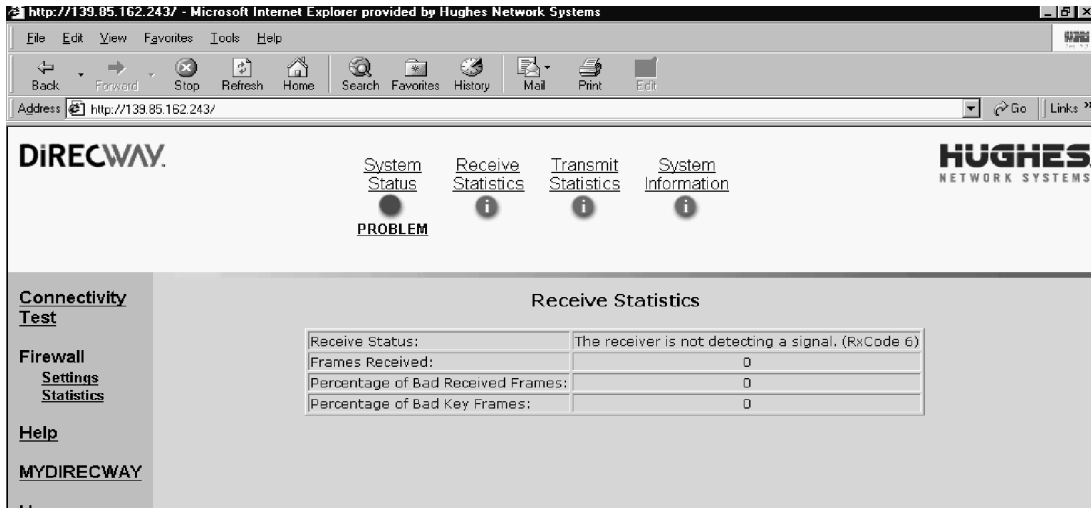
Figure 37: Receive Statistics screen

Transmit Statistics

The **Transmit Statistics** screen contains information about how the transmit modem is processing *transmissions*. It contains the following fields. See Figure 38.

- Transmit Status - displays receive modem status messages. Click on Transmit Status to view a list of transmit status messages. Click on a transmit status message to learn more about it.
- Number of Successful Transmissions- displays the number of successful transmissions.

- Number of Failed Transmissions- number of times the ITU failed to transmit data.
- Number of Packets Submitted for Transmission- number of packets submitted to the transmit modem.
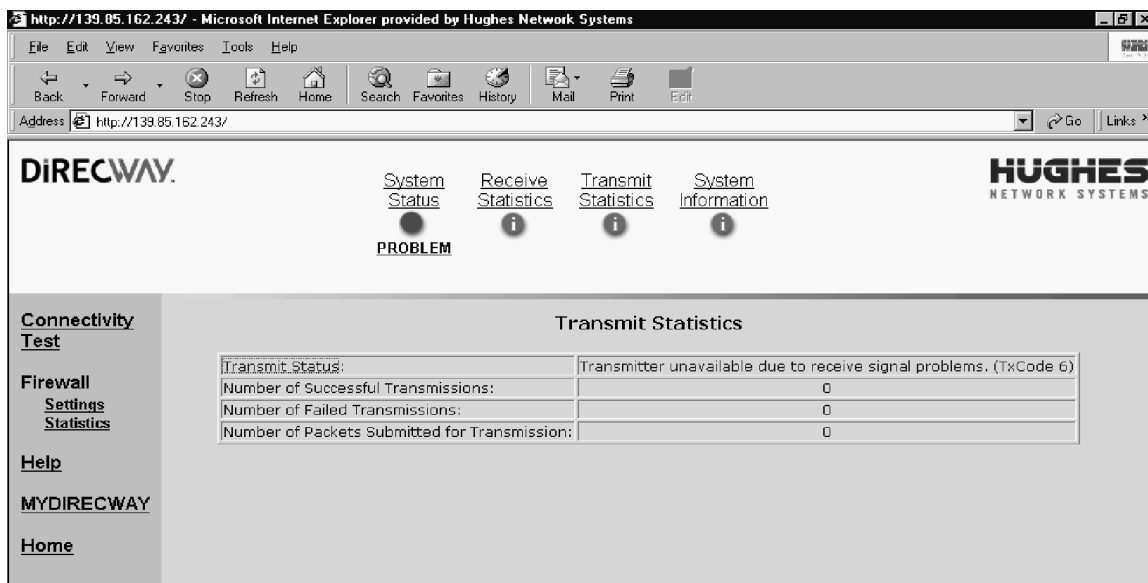
Figure 38: Transmit Statistics screen

System Information

The System Information screen displays a number of fields. While all the information may be useful at some time, the most important is discussed below.

Note: Print the System Information screen and give it to the customer. It will be helpful should they need to call Customer Care and not be able to access the User Interface.

- Gateway section
  - `Commissioned` - displays whether the DW4020 is commissioned.
  - `IP Address` - use this as the default Gateway on the computers connected to the DW4020.
  - `Subnet Mask` - use this as the default Gateway on the computers connected to the DW4020.

- Indoor Receive Unit (Receive Modem) section
  - `Serial number` - needed to identify customer's receive modem when troubleshooting.

- Satellite Transponder section

— `Longitude` - displays the satellite's longitude.
— `Receive Polarization` - polarization orientation.

- **Software Configuration section**- WEB Acceleration, NAT, and DHCP are enabled or disabled as per a customer's service offering and cannot be changed by the customer.

  — `Web Acceleration` - Allows fast access to Internet Web sites and high-speed data download from the Internet.
  — `Network Address Translation (NAT)` - typically used to allow multiple computers to share a single address on the Internet. It also allows preconfigured remote networks to be integrated easily with the DIRECWAY network.
  — `Dynamic Host Configuration Protocol (DHCP)` if enabled, this simplifies the network configuration of the computers. The computers just need to be set up to "Obtain IP address automatically."
  — `Firewall` - can be enabled by the user and configured to help deflect unwanted Internet traffic.
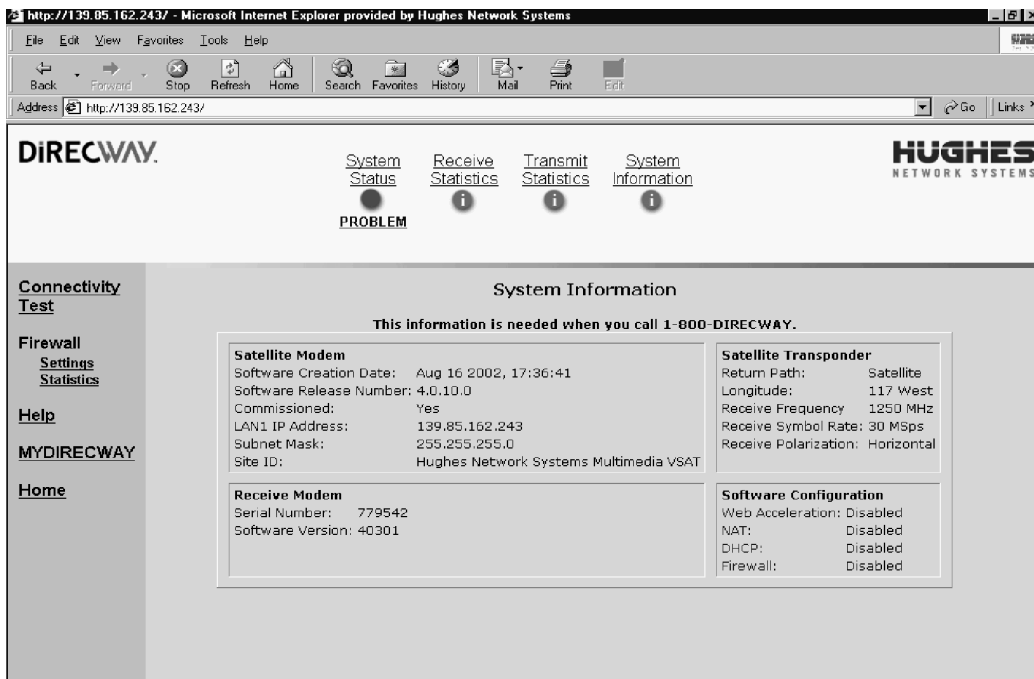
Figure 39: System Information; print and save this screen

The Connectivity Test Menu

You may lose connectivity to a particular server due to the Internet and/or the satellite network being heavily loaded or due to the server being down. If possible, check connectivity to some other server on the Internet to ensure it is not a server specific problem. Follow the procedure below for troubleshooting:

Network Operations Center (NOC) Connectivity

Use the Connectivity Test from the left pane to check connectivity to the DIRECWAY NOC.

Note: You may want to open a second browser window to be able to access this help page while conducting the Connectivity Test.

1. Click on Connectivity Test on the left hand side of the **User Interface**. The screen in Figure 40 appears.
2. Run the test. A message will appear, informing you if the test was successful.

   If the connectivity test succeeds, try pinging the NOC Router Address from the computer. This address can be obtained from the System Information page. See *System Information* on page 45.

   If this succeeds, skip to the Internet Connectivity test below.

   If this fails, the default gateway is probably not set correctly on the computer's network settings. The default Gateway should be the Gateway IP address. Fix this in the computer's network settings and repeat the connectivity test.

   If the test still fails, power-cycle the DW4020 by unplugging the power cord from the wall outlet and plugging it back in. If this doesn't fix the problem, call Customer Care.

   If the connectivity test fails, check the DW4020 configuration via the System Information page.
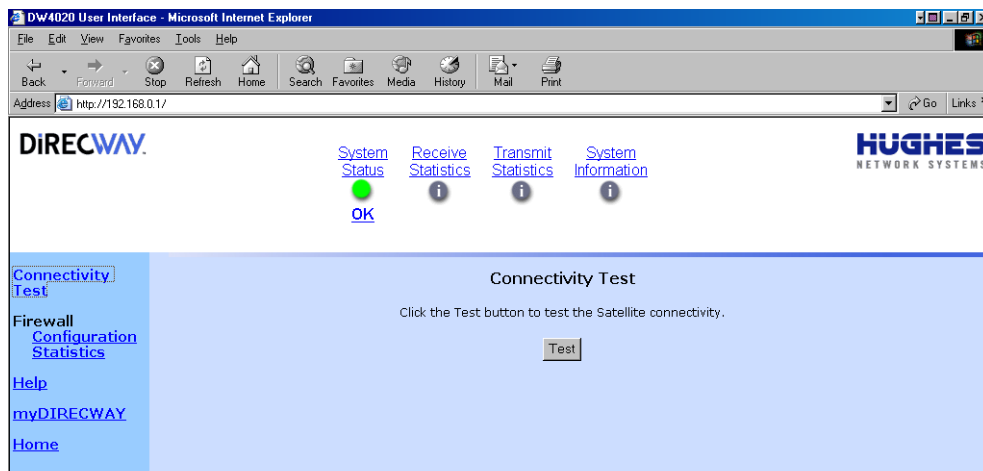
Figure 40: Connectivity Test

Internet Connectivity Try pinging the DIRECWAY Internet server (www.direcway.com).

> **Note:** If you are an enterprise customer and your enterprise has a backbone connection to the Network Operations Center, the DIRECWAY Internet server may not be accessible. In such a case, you should try to ping your enterprise's Internet server.
> If pinging succeeds, the problem is probably in the particular server that you were trying to access or there may be a temporary Internet or your enterprise's backbone connection outage. Please try repeating the test after sometime.

If pinging fails, check your DNS Server settings in **System Information**. If you are using the DIRECWAY DNS Server, make sure the DNS Settings include the "198.77.116.8" address. If you are a business customer contact your System Administrator.

If this problem persists, please contact Customer Care for further assistance.

The Firewall Menu

The User Interface enables customers to enable a firewall and configure its rules. If they use the firewall, they must configure it properly for maximum protection. They should be aware that even an optimally configured firewall cannot be guaranteed to keep out all potentially harmful traffic.

A discussion of the principles applied when setting up a firewall is in the *DW4020 User Guide* (HNS 1032564-0001). There is also a great deal of information in the FAQ section of the Web interface Help menu.

Note: It is important to remember that the firewall checks **inbound packets only.** If you want to check outbound packets, you must obtain another firewall and install it on the network or on selected hosts on the network.

The Settings Menu

The firewall allows configuration of up to 10 rules for blocking packets received over the satellite link. Five port numbers or 5 protocol types in each rule. Which Source IP Addresses are examined for each rule can also be specified. The table below lists some common port numbers and protocols.

1. Open the User Interface and go to *Home→Firewall→Settings*. The screen in Figure 41 appears.
2. Select the Enable Firewall checkbox to enable the firewall.
3. Determine which rule number you want to create or modify.
4. Select a rule type.
5. Select a port or protocol number.
6. Type the source IP address that you want the firewall to check for.
7. You can leave the subnet mask set at 255.255.255.255. Set the Subnet Mask to 0.0.0.0 if you would like to block access from everywhere in a particular rule.
8. Click on the **Save Configurations** button to save the firewall settings.
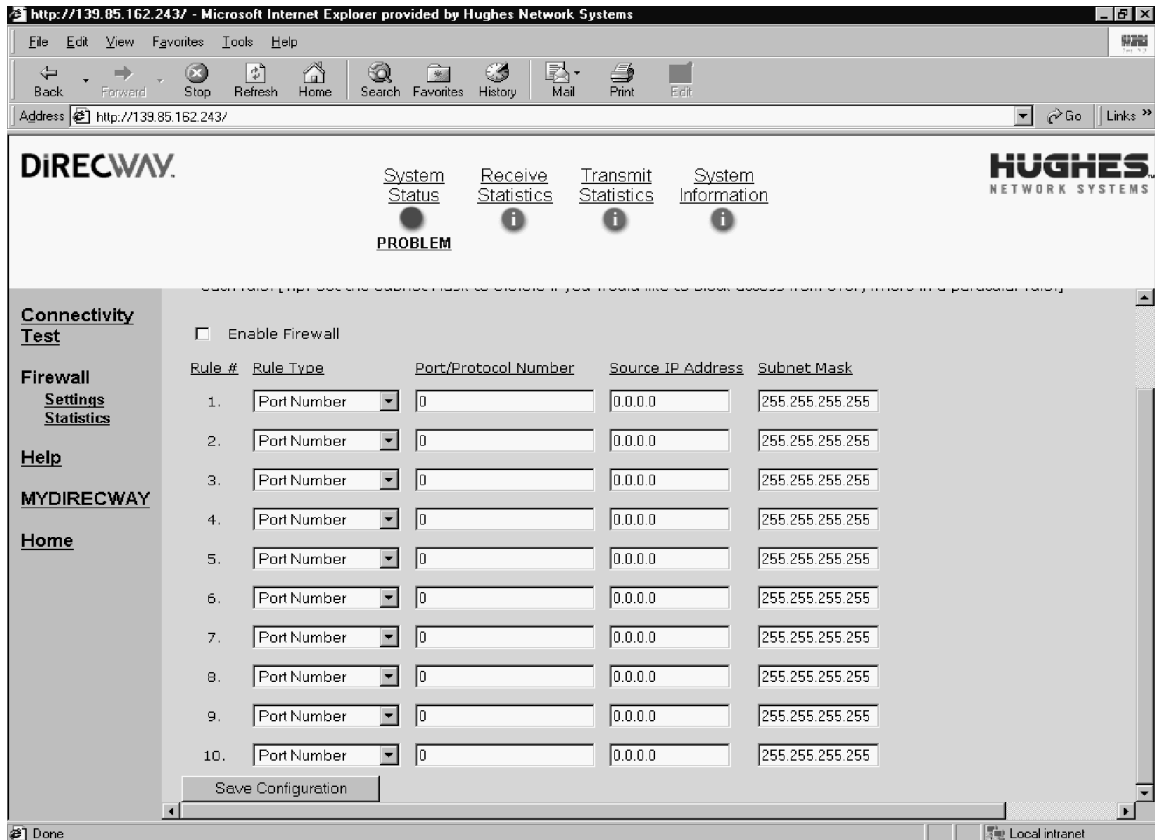
Figure 41: Firewall Settings

Table 8: Port numbers and protocols

Port Number	Internet Application or Protocol
7	Echo
21	FTP control port
23	Telnet
25	Simple Mail Transfer Protocol (SMTP)
53	Domain Name Server (DNS)
70	Gopher
79	Finger
80	Hyper Text Transfer Protocol (HTTP)
107	Remote Telnet Service (RTELNET)
110	Post Office Protocol - Version 3 (POP3)
119	Network News Transfer Protocol (NNTP)
6667	Internet Relay Chat (IRC)

The Help Menu

The **Help Menu** contains information about receive and transmit modem status messages, the firewall, installation, troubleshooting, and other topics. Review it to become familiar with the User Interface and with the DW4020. Access it by clicking on **Help**.

Note: Print the answer to the entry in the User Interface Troubleshooting page, "I am unable to access the DW4020 Web interface. Ping doesn't work also." The information on this page will help you if you cannot access the User Interface.
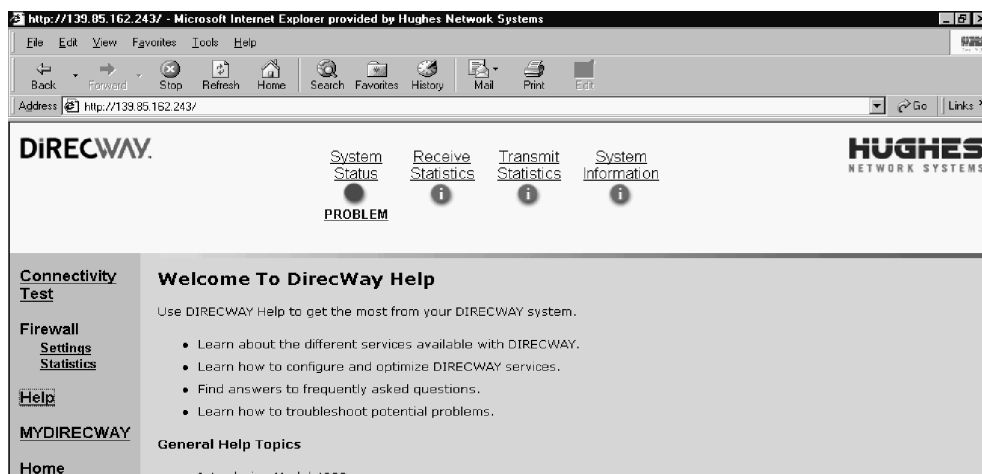
Figure 42: Help Menu

myDIRECWAY

Customers can click on **myDIRECWAY** to go to myDIRECWAY.com. Members get access to a variety of interactive tools and can check usage online, test satellite speed, manage passwords, and more.

myDirecway.com is not an installer resource.

Software updates and the User Interface

The DW4020 software will be updated periodically to provide access to new features and for performance enhancements. Any updates that are not discussed in the User Guide can be found on the **What's New** page in the DW4020 User Interface. The link to this page will be available from the User Interface Home page and also from the FAQ page.

DW4020 LEDs and troubleshooting

The DW4020 LEDs can provide information for troubleshooting units that aren't functioning at all, or don't seem to be functioning as well as they might. The LEDs can show modem or Gateway operational status--whether they are connected, powered up, or working at al. The LEDs can also blink in patterns that correspond to the TxCode and RxCode discussed in *The System Status indicator* on page 36. Finally, the Gateway Ethernet ports have LEDs that indicate their status.

The DW4020 LEDs

The receive modem has a RX and a READY LED. The transmit modem has a TX and a READY LED. The Gateway has a STATUS and READY LED.

Note: Whenever the LEDs do not function properly as described below, check to be sure you have the correct power supply, PN 1031105-0001.

DW4020 LEDs status

This section describes the LEDs' appearance during typical DW4020 operation. It also describes their appearance when some basic problem is occurring.

Normal operation, no transmit or receive

When the DW4020 is powered on but not receiving or transmitting data, it appears as shown in Figure 43. The modems' READY LEDs are continuously lit. Both the Gateway LEDs are continuously lit.

Modems' READY
LEDs continuously lit

Both Gateway LEDs
continuously lit
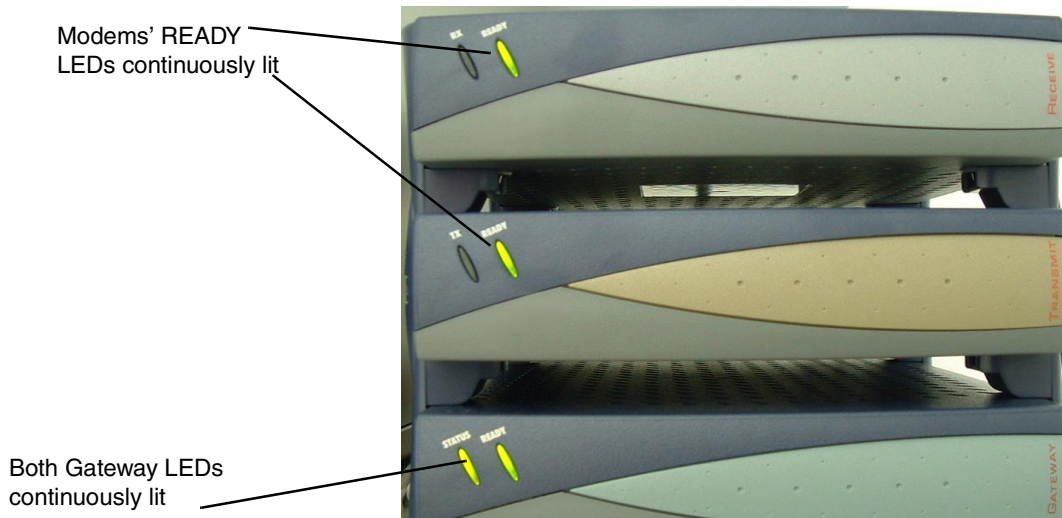
Figure 43: DW4020 normal operation, no data received or transmitted

Normal operation, data being sent and received

During normal DW4020 operation, the modems' READY LEDs are continuously lit, the RX and TX LEDs blink as they pass data, and both the Gateway LEDs are continuously lit, as shown in Figure 44.

RX LED blinks as modem passes data; READY LED on continuously

TX LED blinks as modem passes data; READY LED on continuously

Gateway STATUS and READY LEDs continuously lit
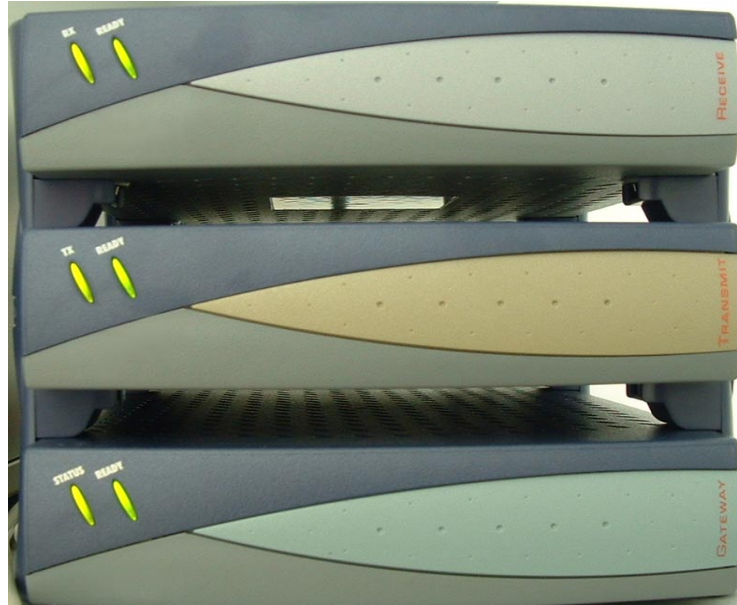
Figure 44: Normal operation, data being sent and received

Problem: receive modem READY LED not on

If the DW4020 is not operating normally and the receive modem's READY LED is not lit, as shown in Figure 45, take the following steps:

- Check to make sure the power cord is securely attached to the receive modem and plugged into the wall outlet or surge protector. See Figure 46. If the power cord was loose, the receive modem READY led will come on when power is restored.
- If securing the power cord does not solve the problem, check all cable connections. Tighten any that seem loose.
- If the Receive modem READY LED still does not come on, power cycle the DW4020 by unplugging the power cord from the wall outlet or surge protector, waiting ten seconds, and plugging it back in.
- If the problem persists, contact technical support.

Note: Often, if the receive modem READY LED is not lit, the other modem LEDs will not be lit either.

Receive modem READY LED
not lit. Note that in many
cases other modem LEDs
will not be lit either.

Figure 45: Receive modem READY LED not lit

Ethernet card

AC power
cord

Receive
modem

Transmit
modem

Power
supply

DC power
cord

Gateway

Ethernet cables

T0091013
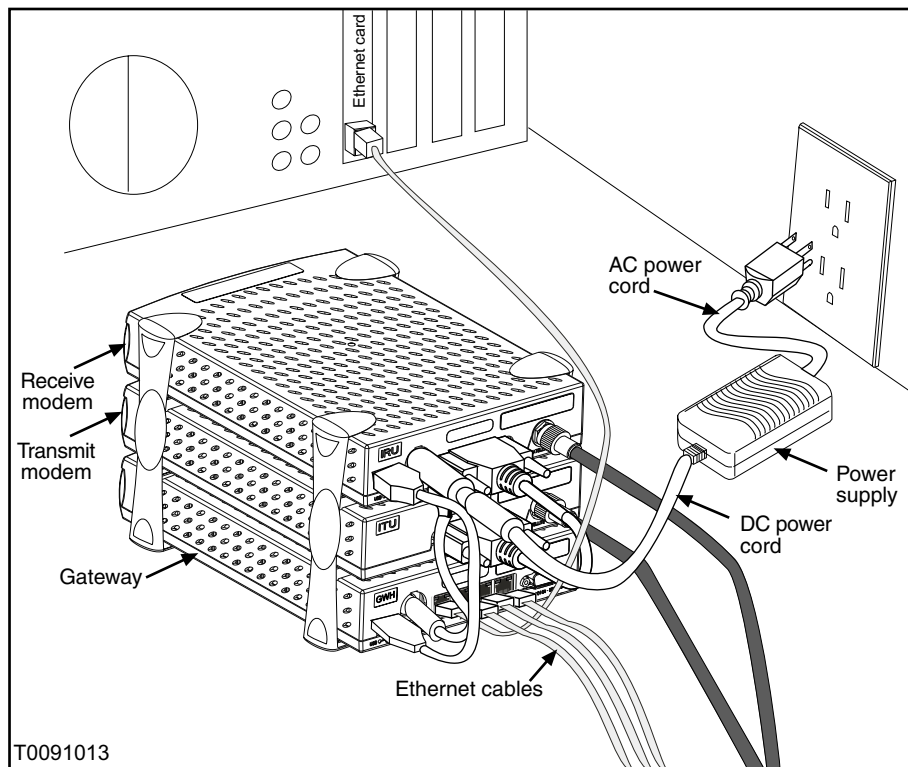
Figure 46: DW4020 power and cable connections

Transmit modem READY LED not lit   If the transmit modem is not operating normally and its READY LED is not lit, as shown in Figure 47, take the following steps.

- Check that the receive modem READY LED is continuously lit. If not, try the sequence in *Problem: receive modem READY LED not on* on page 55.
- Check that the 25-pin connector is attached securely. See Figure 46.
- Check to make sure the power cord is securely attached to the receive modem and plugged into the wall outlet or surge protector. See Figure 46. If the power cord was loose, the transmit modem READY led may come on.
- If securing the power cord does not solve the problem, check all cable connections. Tighten any that seem loose.
- If the transmit modem READY LED still does not come on, power cycle the DW4020 by unplugging the power cord from the wall outlet or surge protector, waiting ten seconds, and plugging it back in.
- If the problem persists, contact technical support.

Receive modem READY LED continuously lit, showing that it is functioning

Transmit modem READY LED not lit
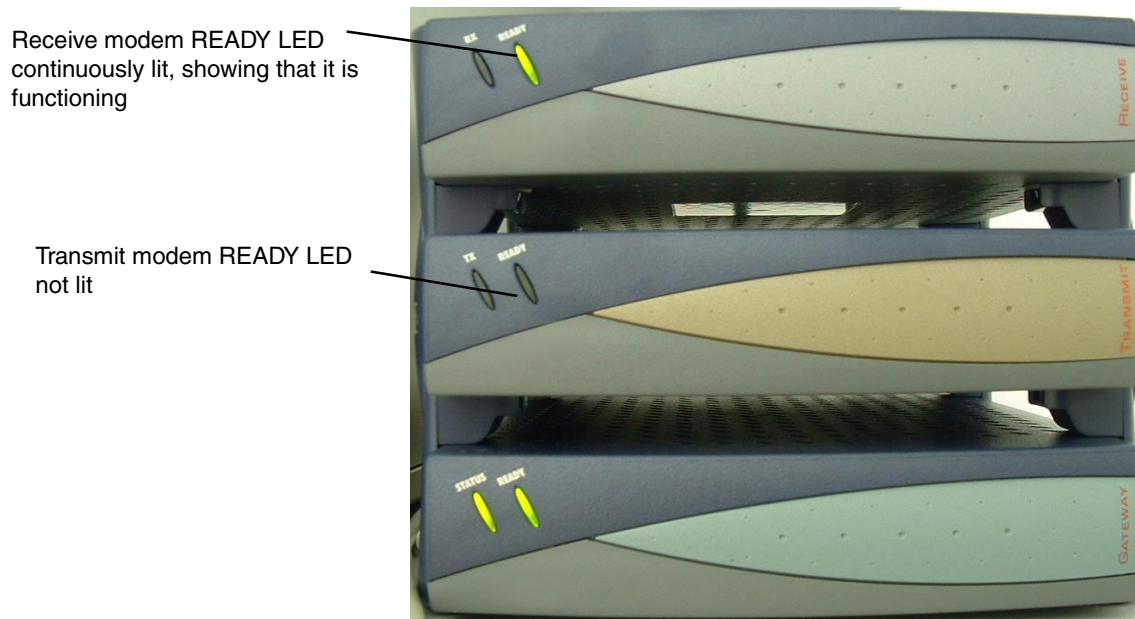
Figure 47: Transmit modem READY LED not lit

Gateway LEDs not lit If the Gateway does not seem to be functioning and its LEDs are not lit, and the receive modem READY LED blinks as shown in Figure 48, take the following steps.

- Check to make sure the power cord is securely attached to the Gateway and receive modem and plugged into the wall outlet or surge protector. See Figure 46. If the power cord was loose, the Gateway and receive modem READY LEDs will come on when power is restored.
- If securing the power cord does not solve the problem, check all cable connections. Tighten any that seem loose.
- If the Gateway READY LED still does not come on, power cycle the DW4020 by unplugging the power cord from the wall outlet or surge protector, waiting ten seconds, and plugging it back in.
- If the problem persists, contact technical support.

Receive modem READY LED blinks

Gateway LEDS are not lit

Figure 48: Gateway LEDs not lit

Gateway LEDs flash, receive modem READY LED off or flashing

If the Gateway does not seem to be functioning and its STATUS LED flashes amber, and the receive modem READY LED blinks or is not lit, as shown in Figure 48, take the following steps.

- Check to make sure the USB cable is securely attached to the Gateway and receive modem. See Figure 46. If the cable was loose, the Gateway and receive modem READY LEDs will come on when it is reattached.
- If securing the USB cable does not solve the problem, check all cable connections. Tighten any that seem loose.
- If the Gateway STATUS LED still does not come on continuously, power cycle the DW4020 by unplugging the power cord from the wall outlet or surge protector, waiting ten seconds, and plugging it back in.
- If the problem persists, contact technical support.

Receive modem READY
LED blinks or is not lit

Gateway STATIS LED
blinks amber
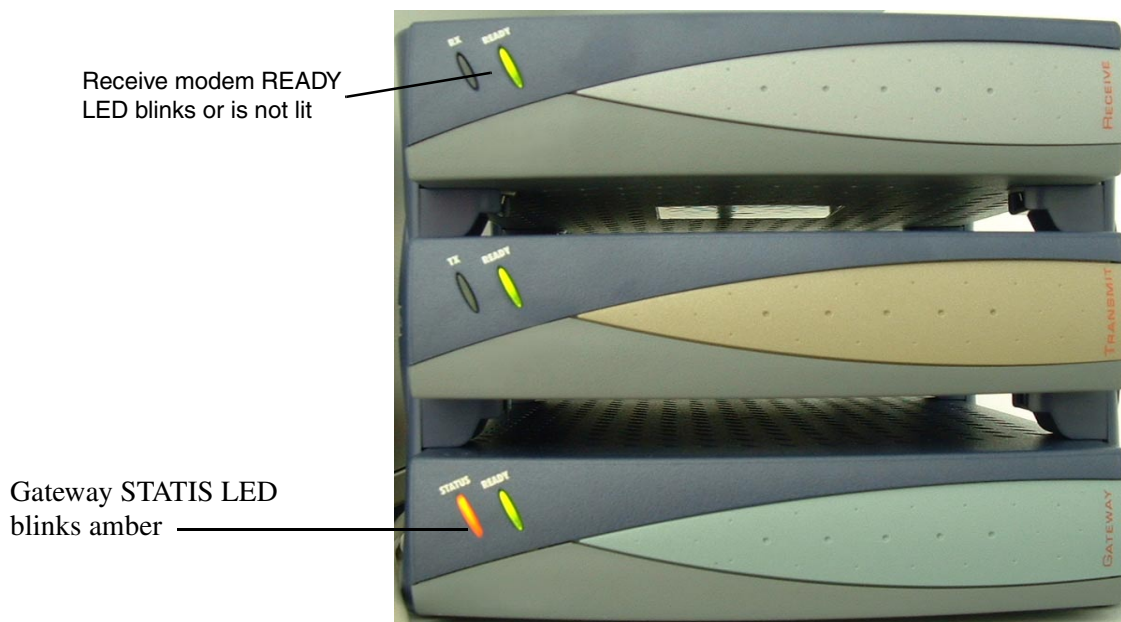
Figure 49: Gateway STATUS LED blinks amber

LED blinking indicating status codes

The DW4020 modems' READY LEDs can blink in various patterns. These patterns correlate to the status codes discussed in *Transmit Status messages* on page 37 and *Receive Status messages* on page 42. If you can see the patterns, you also have access to the **User Interface**. It will be easier to find out what the status of the DW4020 is via the interface than the LED status blinking. The blink patterns are described below for your information.

Transmit READY LED Pattern	Corresponding transmit status messages
Off	`4` (or powered off)
On	`8`
2 Long, 1 Short	`1`
2 Long, 2 Short	`2`
2 Long, 3 Short	`11`
1 Long, 1 Short	`3`
1 Short	`5`
2 Short	`10, 13, 14, 15, 16, 21, 22, 23`
3 Short	`6, 7`
4 Short	`12, 17`
Slow Alternating	`9, 18, 19, 20`
Fast Alternating	The ITU interface testing – This is a continuous fast blinking pattern, with the Transmit LED being the inverse of the Ready LED. No corresponding message.

Receive READY LED Pattern	Corresponding receive status message
Fast Alternating	Prior to downloading software– This is a continuous fast-blinking pattern, with the RX LED being the inverse of the Ready LED. No corresponding message.
Slow Alternating	1
On	5
1 Long, 1 Short	3,6
1 Long, 2 Short	4,7
1 Short	0
1 Long, 1 Short, 1 Long	2

Table 9: Receive modem READY LED blink patterns

Ethernet port LEDs

Each of the four Ethernet ports on the DW4020 has two LEDs associated with it. One LED is green and one is yellow. See Figure 50).

The green LED will be on if power is applied to the DW4020 and a 100baseT Ethernet device is connected to the corresponding Ethernet port. Otherwise, the green LED will be off.

If the power is on and the light is off while a network device is connected, then the device is a 10baseT device and the port is autosensing.

The yellow LED will also be on when power is applied to the DW4020. It will flash momentarily when there is LAN activity on the corresponding Ethernet port.

Figure 50: Ethernet port LEDs

Glossary

D

Dotted decimal notation - An IP address consists of 32 bits. Rather than working with 32 bits at a time, it is a common practice to segment the 32 bits of an IP address into four 8-bit fields called octets. Each octet is converted to a decimal number (the Base 10 numbering system) in the range 0-255 and separated by a period (a dot).

Dynamic Host Configuration Protocol (DHCP) - a communications protocol that lets network administrators manage centrally and automate the assignment of Internet Protocol (IP) addresses in an organization's network.

.

E

Enterprise - an entity autonomously operating a network using TCP/IP and in particular determining the addressing plan and address assignments within that network.

G

Gateway - the receive modem, the transmit modem, and the Gateway host when cabled together form the Gateway. Also called the DW4020.

Gateway host - downloads code to the IRU, performs PEP and decompression functions, and monitors and controls the operation of the IRU/ITU. In addition, the Gateway host supports configuration, status monitoring, and commissioning using a "dumb terminal" connected to an asynchronous serial port.

H

Host - In packet- and message-switching communications networks, the collection of hardware and software that makes use of packet or message switching to support user-to-user, i.e., end-to-end, communications, interprocess communications, and distributed data processing. More simply, any computer that has full two-way access to other computers on the Internet.

I

Internet Assigned Numbers Authority (IANA) - the organization that has overseen the allocation of Internet Protocol addresses to Internet service providers (ISPs).

Internet protocol (IP) - The method or protocol by which data is sent from one computer to another on the Internet. Each computer (known as a host) on the Internet has at least one IP address that uniquely identifies it from all other computers on the Internet. The protocol within TCP/IP that governs the breakup of data messages into packets, routing the packets from sender to destination network and station, and reassembling the packets into the original data messages at the destination.

Internet service provider (ISP) - A business that supplies Internet connectivity services to individuals, businesses, and organizations. Some ISPs are large national or multinational corporations that offer access in many locations, while others are limited to a single city or region.

IP address - a 32-bit number that identifies each sender or receiver of information that is sent in packets across the Internet. An IP address has two parts: the identifier of a particular network on the Internet and an identifier of the particular device (which can be a server or a workstation) within that network. On the Internet itself - that is, between the router that move packets from one point to another along the route - only the network part of the address is looked at.

L

Local area network (LAN) - a group of computers and associated devices that share a common communications line and typically share the resources of a single processor or server.

N

National Operations Center - A place from which a network is supervised, monitored, and maintained.

Network Address Translation - a method of connecting multiple computers to the Internet (or any other IP network) using one IP address.

P

Performance enhancing proxy (PEP) - modules that provide TCP acceleration. PEP is used to improve the performance of the Internet protocols on network paths where native performance suffers due to characteristics of a link or subnetwork on the path.

Private IP addressing - A computer on the Internet is identified by its IP address. In order to avoid address conflicts, IP addresses are publicly registered with the Network Information Centre (NIC). Computers on private TCP/IP LANs however do not need public addresses, since they do not need to be accessed by the public. For this reason, the NIC has reserved certain addresses that will never be registered publicly. These are known as private IP addresses.

R

Receive modem - downloads data from the satellite. Also known as indoor receive unit (IRU).

Router - a device or, in some cases, software in a computer, that determines the next network point to which a packet should be forwarded toward its destination.

S

Signal quality factor (SQF) - an integer value from 0-99 that indicates the strength of the received satellite signal relative to noise.

Subnet mask - a 32-bit value that is used to distinguish the network ID from the host ID in an arbitrary IP address. Each host on a network requires a subnet mask.

T

TCP/IP internet protocol suite - the basic communication language or protocol of the Internet.

TCP spoofing - technique of using local devices to answer TCP overhead messages. Also known as Turbo Internet.

Transmission control protocol (TCP) - a set of rules (protocol) used along with the Internet Protocol (IP) to send data in the form of message units between computers over the Internet. While IP takes care of handling the actual delivery of the data, TCP takes care of keeping track of the individual units of data (called packets) that a message is divided into for efficient routing through the Internet.

Transmit modem - sends (uploads) data to the satellite. Also known as indoor transmit unit (ITU).

Turbo Internet - A high-speed satellite link from the Internet, allowing users to download information at a very high rate. Turbo Internet services provide asymmetric connections between a customer PC and the Internet. This enables users to download very large files at a very high rate of speed.

Abbreviations and Acronyms

Abbreviation or Acronym	Term
DHCP	dynamic host configuration protocol
GWH	Gateway host
IANA	Internet Assigned Numbers Authority
IP	Internet protocol
IRU	indoor receive unit
ISP	Internet service provider
ITU	indoor transmit unit
LAN	local area network
NAT	network address translation
NMC	network management center
NOC	network operations center
OPI	outdoor pointing interface
PEP	performance enhancing proxy
RX	receive
SDL	software download
TCP	transmission control protocol
TCP/IP	transmission control protocol/Internet protocol
TX	transmit

Use the following procedure to determine your latitude and longitude decimal to minutes conversion.

1. Enter the whole number part of the site's longitude into the VSAT Longitude in degrees field in the **Configure Boot Parameters** screen.
2. Take the two digits immediately to the right of the longitude decimal point (without doing any rounding) and use the chart below to translate these two digits into the number of minutes.
3. Enter the minutes number into the VSAT Longitude in minutes field in the **Configure Boot Parameters** screen.
4. Repeat steps 1, 2, and 3 for the VSAT Latitude in degrees and VSAT Latitude in minutes fields.

For example, if the site's coordinates are:

Longitude: 77.2395 deg. West
Latitude: 38.8351 deg. North

You should enter:

VSAT Longitude in degrees: 77
VSAT Longitude in minutes: 14
VSAT Longitude Hemisphere (0 = East, 1 = West) <1>: 1
VSAT Latitude in degrees: 38
VSAT Latitude in minutes: 50
VSAT Latitude Hemisphere (2 = North, 3 = South) <2>: 2

Right of Decimal	Minutes	Right of Decimal	Minutes	Right of Decimal	Minutes
.01	1	.36	22	.71	43
.02	1	.37	22	.72	43
.03	2	.38	23	.73	44
.04	2	.39	23	.74	44
.05	3	.40	24	.75	45
.06	4	.41	25	.76	46
.07	4	.42	25	.77	46
.08	5	.43	26	.78	47
.09	5	.44	26	.79	47
.10	6	.45	27	.80	48
.11	7	.46	28	.81	49
.12	7	.47	28	.82	49
.13	8	.48	29	.83	50
.14	8	.49	29	.84	50
.15	9	.50	30	.85	51
.16	10	.51	31	.86	52
.17	10	.52	31	.87	52
.18	11	.53	32	.88	53
.19	11	.54	32	.89	53
.20	12	.55	33	.90	54
.21	13	.56	34	.91	55
.22	13	.57	34	.92	55
.23	14	.58	35	.93	56
.24	14	.59	35	.94	56
.25	15	.60	36	.95	57
.26	16	.61	37	.96	58
.27	16	.62	37	.97	58
.28	17	.63	38	.98	59
.29	17	.64	38	.99	59
.30	18	.65	39		
.31	19	.66	40		
.32	19	.67	40		
.33	20	.68	41		
.34	20	.69	41		
.35	21	.70	42		

Internet protocol (IP) and transmission control protocol (TCP)

The Internet Protocol (IP) provides a format for moving packet data from node to node. The IP enables data to move from department to organization, to a region, across regions, to destination organizations, and to departments. The IP layer serves as the basis for other protocol layers, as shown in Table 10.

The transmission control protocol (TCP) verifies correct delivery of data. TCP detects errors or lost data. TCP initiates retransmission so that the data is eventually correctly received.

The use of these two protocols, together along with a suite of other protocols, has been given the official name TCP/IP internet protocol suite, or, more commonly TCP/IP.

Table 10: The Internet Protocol (IP) is the basis for other protocol layers

FTP – File Transfer Protocol	IP – multicast
• Reliable method for delivering files from a host machine to remote personal computers	• Universal way to broadcast digital content to multiple locations • Takes maximum advantage of DIRECWAY satellite star network topology
TCP – Transmission Control Protocol	UDP – User Datagram Protocol
• Session oriented protocol verifies correct data delivery • For delivering web pages and mission critical data	• Datagram oriented protocol method for delivering short messages between two points • Basis of IP-multicast
IP – Internet Protocol	
• Format for moving data from node to node • Basis for all of the above protocols • Becoming *de facto* standard for digital transmission – data, video and audio • Widespread acceptance in the corporate world	

Turbo Intranet™

Turbo Intranet is an HNS technique that increases the TCP throughput across the satellite link. Turbo Intranet involves using local devices to answer TCP overhead messages in the place of distant devices. These devices efficiently send outroute data over the spacelink and buffer the data for transfer to local hosts within

their TCP limits, vastly increasing the overall throughput. This technique is also known as *TCP spoofing*.

IP addressing and the DW4020

IP provides a method of constructing a network of networks where computers and networks made by different manufacturers and conforming to different standards can exchange information. The IP is layered on top of vendor-specific protocols. The data to be sent is divided into packets. IP directs each packet based on a four-byte destination address, the IP address, in the IP packet header.

The Internet Assigned Numbers Authority (IANA) assigns ranges of IP addresses to Internet Service Providers (ISPs), who assign ranges to organizations, who are their customers. The organizations, in turn, assign individual numbers within that range to each of their networked computers.

In this way, every computer on a network, (each computer on a network may also be referred to as a "host") is assigned a unique number that identifies it and its network. Actually, the IP address is assigned to the connection rather than to the computer itself. However, it is assumed that the computers are not moved from their respective connections. By convention, these IP addresses are written by converting each byte (8 bits) into a decimal number (0 to 255) and separating each byte by a period as in 192**.**77**.**43**.**4. This format, called *dotted decimal notation*, is used to enter IP addresses.

It is important to note that IANA defines an "enterprise" as an entity autonomously operating a network using TCP/IP and in particular determining the addressing plan and address assignments within that network. Thus, in the context of TCP/IP, installing networks or DW4020s, or assigning IP addresses, the term *enterprise* refers to an organization defined in this way.

As an example of Internet address assignment, a small business owner with four networked computers might apply to IANA or its ISP for a "class C" network. In the IP address for a class C network the first three bytes identify the network and the last byte identifies the individual computer. The business owner is assigned the numbers 192**.**77**.**43**.***, where * represents a "wild

card." The business owner can then assign his individual computer connections the numbers as shown in Figure 51.

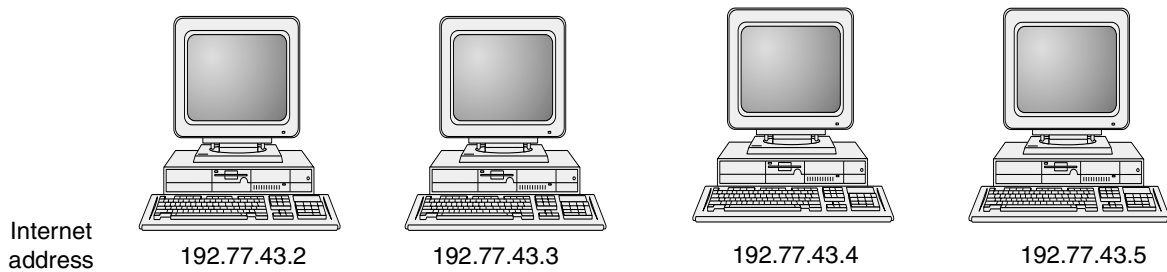|			
Internet address	192.77.43.2	192.77.43.3	192.77.43.4	192.77.43.5

Figure 51: IP addresses assigned to individual computer connections

A large organization like a university might apply for a class B network, in which the first two bytes are assigned and the last two bytes are available to the university to assign up to 64 thousand computers in sub-network LANs. For example, the university might be assigned a number like 170.15.*.*. The university, in turn, could make assignments such as: 170.15.100.* = Physics department LAN sub-network, 170.15.101.* = central library LAN1 sub-network, and so on. It is a common practice to assign the third byte to individual department LANs and the fourth byte to individual computers within each department.

A very large entity might require a class A network that would allow over 16 million individual IP address assignments. Table 11 gives the ranges of IP addresses IANA reserves for specific purposes.

HNS customers have already acquired IP address ranges and supply these as needed to HNS installers.

Note, however, that many organizations of various sizes now use *private IP addressing* (see *Private IP addresses* below). These organizations do not need to assign a unique public IP address to each computer (or "host") on their networks.

Table 11: IP Address ranges

Category	Lowest address	Highest address	Example or comment
Class A network	0.1.0.0	126.0.0.0	9.*.*.* for IBM Corp.
Class B network	128.0.0.0	191.255.0.0	170.15.*.* – a university
Class C network	192.0.1.0	223.255.0.0	192.77.43.* – small business
D – multicast	224.0.0.0	239.255.255.255	

Private IP addresses As Internet use has increased, more and more IP addresses have been assigned. There is not an infinite number of IP addresses, and IANA is concerned that the supply of unique IP addresses could be exhausted. One way to conserve IP addresses is to assign them only to hosts that are designated as "public." Hosts that are designated as "private" do not need unique IP addresses.

Types of hosts IANA has created three categories of hosts:

> **Category 1:** hosts that do not require access to hosts in other enterprises or the Internet at large; hosts within this category may use IP addresses that are unambiguous within an enterprise, but may be ambiguous between enterprises.
>
> **Category 2:** hosts that need access to a limited set of outside services (e.g., E-mail, FTP, netnews, remote login) which can be handled by mediating gateways (e.g., application layer gateways). For many hosts in this category an unrestricted external access (provided via IP connectivity) may be unnecessary and even undesirable for privacy/security reasons. Just like hosts within the first category, such hosts may use IP addresses that are unambiguous within an enterprise, but may be ambiguous between enterprises.
>
> **Category 3:** hosts that need network layer access outside the enterprise (provided via IP connectivity); hosts in the last category require IP addresses that are globally unambiguous.

Hosts in categories 1 and 2 are private hosts. Hosts in Category 3 are public hosts. Hosts in categories 1 and 2 do not need to be directly accessible from other networks. These hosts might include airport arrival/departure displays, automatic teller machines, or equipment at clerical positions. Thus, these private hosts do not need unique IP address numbers. The IP addresses private hosts are assigned need only be unique *within* the network; they need not be directly accessible from other networks.

In addition, for security reasons, many enterprises use application layer gateways to connect their internal network to the Internet. The internal network usually does not have direct access to the Internet; thus, only one or more gateways are visible from the Internet. In this case, the internal network can use non-unique IP network numbers.

In short, there are many devices that can be connected on an internal Internet or intranet that need never be assigned unique IP addresses. In this way, IP addresses are conserved.

Private address space IANA has reserved the following three blocks of the IP address space for private internets:

```
10.0.0.0      -  10.255.255.255 (10/8 prefix)
172.16.0.0    -  172.31.255.255 (172.16/12 prefix)
192.168.0.0   -  192.168.255.255 (192.168/16 prefix)
```

The first block is the "24-bit block," the second is the "20-bit block," and to the third is "16-bit" block. Note that the first block is nothing but a single class A network number, while the second block is a set of 16 contiguous class B network numbers, and third block is a set of 256 contiguous class C network numbers.

An enterprise that decides to use IP addresses out of these address spaces can do so without any coordination with IANA or an Internet registry. The address space can thus be used by many enterprises. Addresses within this private address space will only be unique within the enterprise, or the set of enterprises which choose to cooperate over this space so they may communicate with each other in their own private internet. An enterprise that requests IP addresses for its external connectivity will never be assigned addresses from the blocks defined above.

Private IP addressing and DW4020 customers

DW4020 customers who use private addressing must install a router or switch between the DW4020 and their network. They will also need to provide the installer with the LAN Gateway address and, if applicable, the LAN subnet mask (see *Configuring the Gateway host in Chapter 3*).

DW4020s provide connections

The DW4020 provides connectivity from a satellite network to multiple computers.

From the point of view of the individual computer user, the DW4020 provides the link to the outside world. DW4020s direct data traffic by inspecting the IP addresses. A DW4020 is assigned two IP addresses, one in each network that it links.

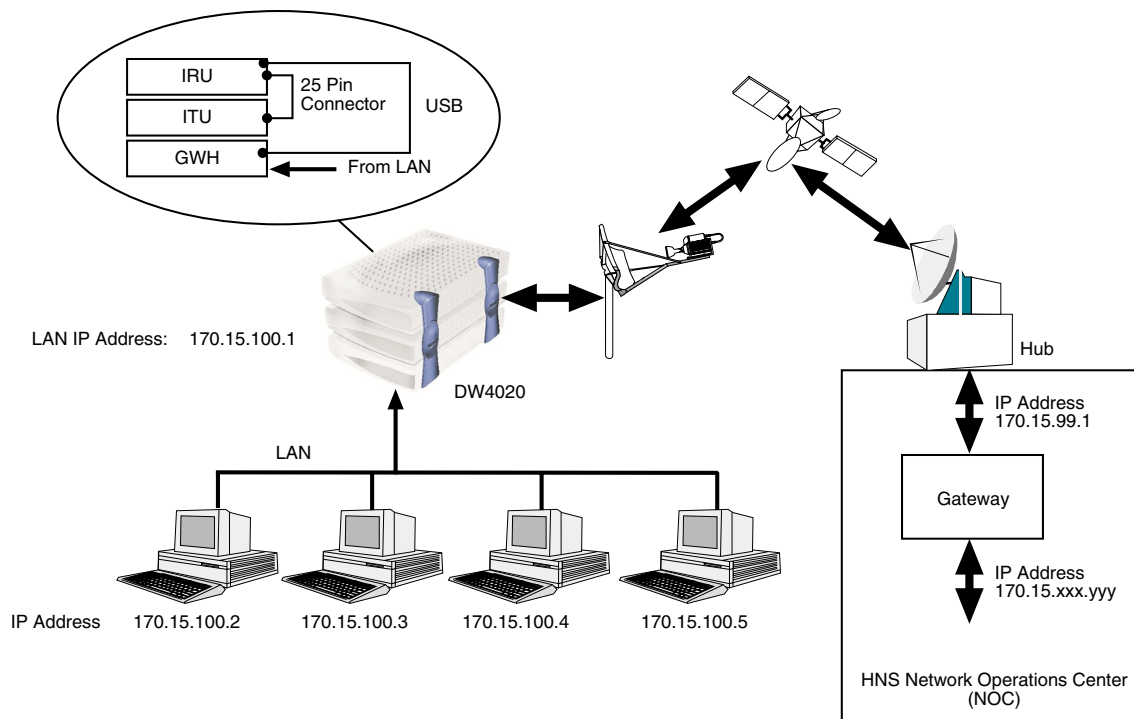Figure 52 illustrates a typical connection scheme for the DW4020.

Figure 52: Typical DW4020 connection scheme

Subnet mask The subnet mask defines the part of the IP address used to identify computers on the same LAN from computers in other departments or elsewhere in the world. Computers on the same LAN can send messages directly to each other. Messages for other LANs and the rest of the world need to be sent through a router. In a scheme where the first three bytes identify the LAN network, the subnet mask is 255.255.255.0. The decimal number 255 corresponds to the binary number 11111111. In IP address notation, 0 is interpreted to mean "this."

Appendix C
Installing the DW4020 Manually

The installation specification may direct you to install the DW4020 using the serial port. You would connect the installer laptop to the Gateway via the serial ports with a 9-pin female to female (F/F) null modem serial cable. That cable is not included with any DW4020 equipment.

Items needed for installation

You need all the items shown in Figure 53. Some of them are in the modem installation kit or inside the antenna box. You must provide a 9-pin female/female (F/F) null modem serial cable. The serial cable is used to configure the DW4020 via the serial port. You will also need the installation specification or work order. This is provided to you by HNS.
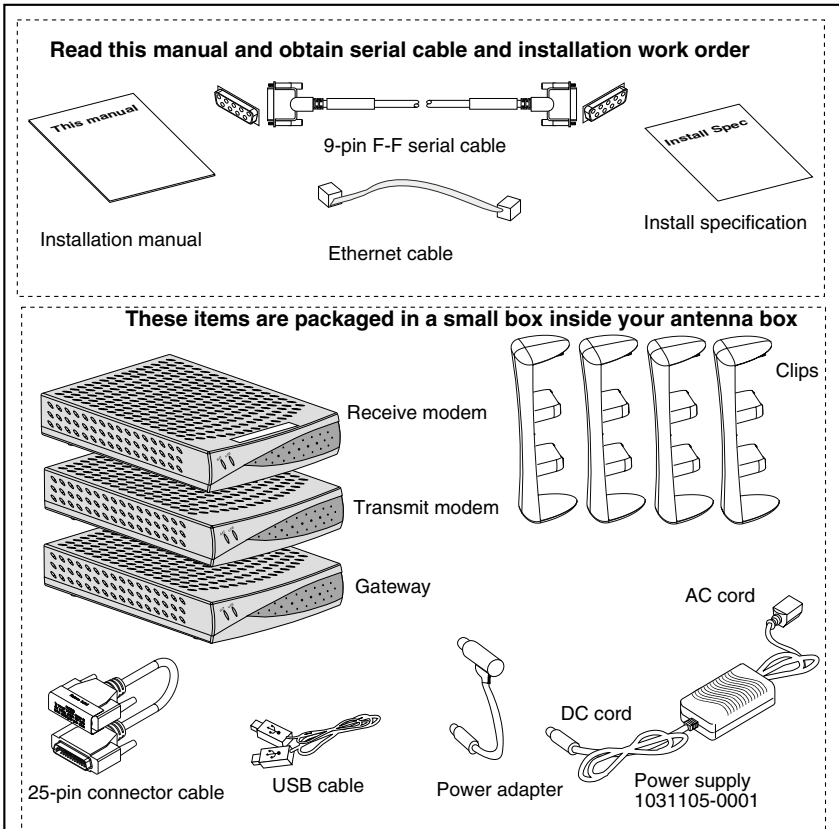

Figure 53: Items required for installation

The power supply DW4020 users must use a power supply with the part number P/N: 1031105-0001. The part number is on a sticker on the power supply. Verify that you are using the correct power supply. Do not use anything but the power supply supplied with the DW4020 system (1031105-0001).

Be sure the power supply is labeled **ADP 64AB B** in the upper right hand corner of the label, above the bar codes. See Figure 54.

CAUTION

- **This unit's performance may suffer if the wrong power supply is used.**
- **This unit must be used with the power supply PN 1031105-0001.**
- **When power needs to be removed from the receive modem, ALWAYS unplug the AC power cord from either the wall outlet, surge protector, or power strip.**
- **NEVER pull the power cord from the back of the receive modem. Doing so could damage the pins and also cause a short in the system.**
- **Power supply with the part number 1031105-0001 is to be used only in the United States and Canada.**
- **This unit must be used with 110-volt AC input.**
- **Other countries may have different standards and requirements.**

PN: 1031105-0001　　**ADP-64AB B**

Figure 54: PN: 1031105-0001 and ADP-64AB B above bar code

Assembling the components
Follow the steps below and refer to the illustrations on page 80 through page 83 to assemble the DW4020 components. After you assemble the components, you can plug in the power supply and observe the LED display cycling, as explained in *The DW4020 LEDs* on page 86.

CAUTION

- **The components must be stacked in this order: Gateway on bottom; transmit modem on top of Gateway; receive modem on top of transmit modem. See Figure 57.**
- **If the components are not stacked in the proper order, the receive modem may overheat and malfunction.**
- **Do not block any ventilation openings. Do not install near any heat sources such as radiators, heat registers, ovens, stoves, or other apparatus (including amplifiers) that produce heat.**
- **Recommended ventilation space around the top and sides of the DW4020 assembly should be approximately 6 inches. Ventilation is necessary to avoid overheating.**

---

1. Write down the receive modem serial number. It is located below the barcode on the back of the modem and is the second portion of the line. (For example, R1CF4B21E - **00827500** would be Serial Number **827500**.)
2. Be sure the power supply is not plugged into a wall outlet, surge protector, or power strip.
3. Lay two of the four clips on a table and mount the components as shown in Figure 55. Mount the Gateway first, then the transmit modem, then the receive modem.
4. Turn the component stack right side up and install the other two clips as shown in Figure 56.

   Note: The Gateway and the transmit modem have a hole at the center of each of its four feet. There is a tab on the bottom of each mounting clip, which snaps into place on the Gateway when properly aligned over the hole.There is also a tab in the middle of each mounting clip, which snaps into place on the transmit modem when properly aligned over the hole.
   Note:

5. Double-check that the components are installed in this order from top to bottom: receive modem, transmit modem, Gateway (see Figure 57).

Figure 55: Mount the components on two clips

Figure 56: Attach the other clips

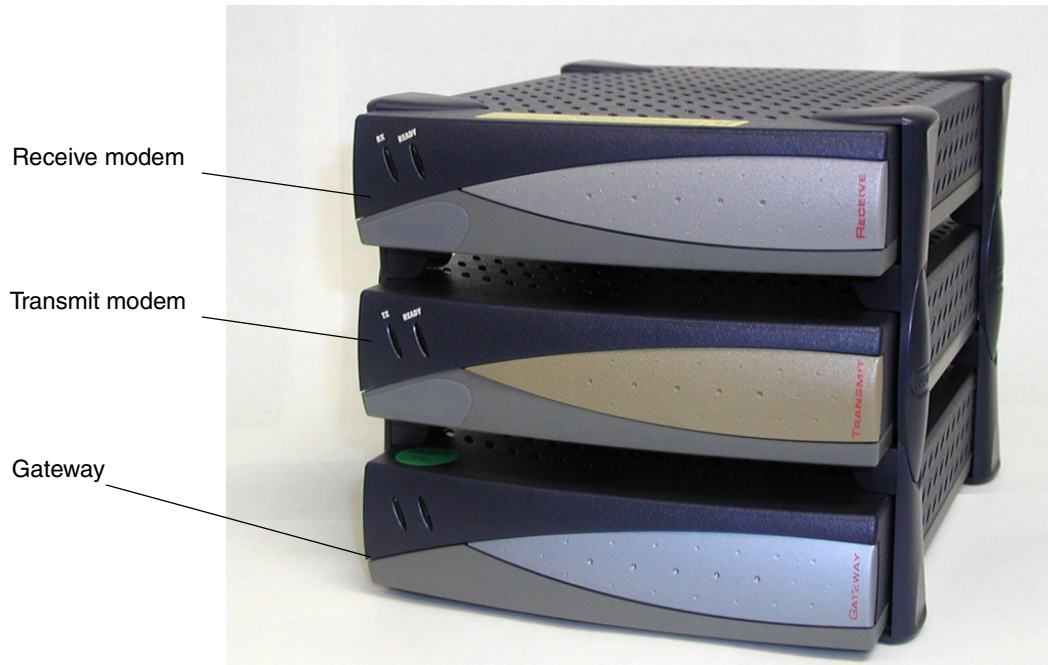Receive modem

Transmit modem

Gateway

Figure 57: Component stack

6. Connect the component interconnection cables. A short USB cable connects the receive modem and the Gateway. A 25-pin connector cable connects the transmit and receive modems. A power supply adapter cable provides power to the Gateway and receive modem (see Figure 58).

7. Connect the receive coaxial cable to the receive modem and the transmit coaxial cable to the transmit modem (see Figure 59).
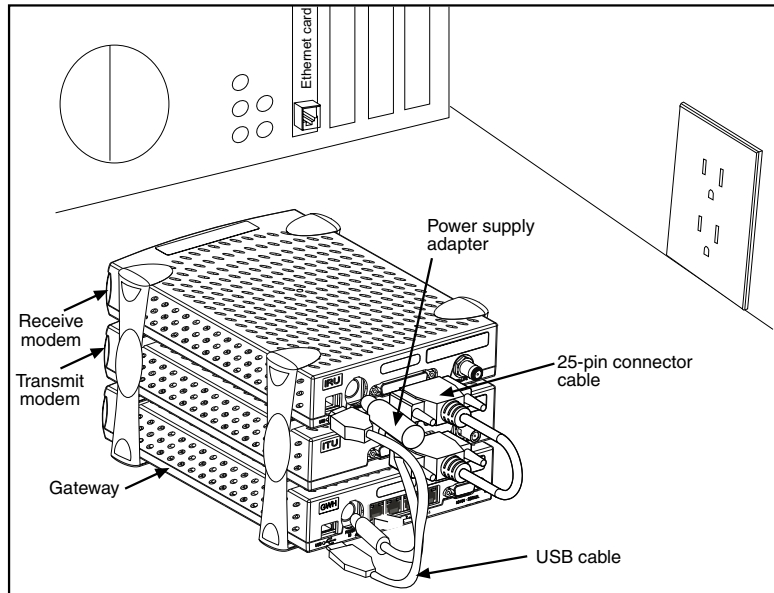

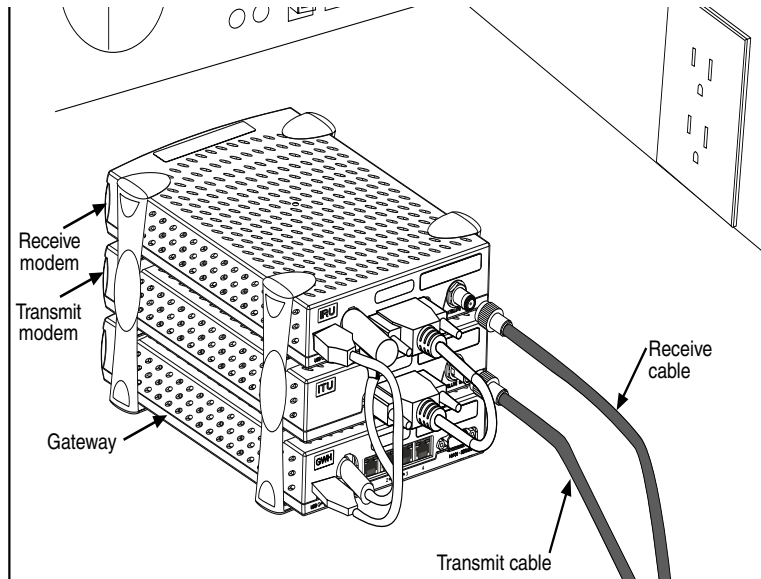Figure 58: Attach interconnection cables

Figure 59: Attach coaxial cables

8. Connect up to four Ethernet cables to the network ports on the Gateway (see Figure 60). Either a straight-through or a cross-over Ethernet cable can be used. The four ports labeled 1 through 4 are Ethernet 10 Base - T/100 network ports. They enable you to connect to other computers via an Ethernet connection. (Reference UL 60950, Annex NAA, Subclause reference 6, page 322.)
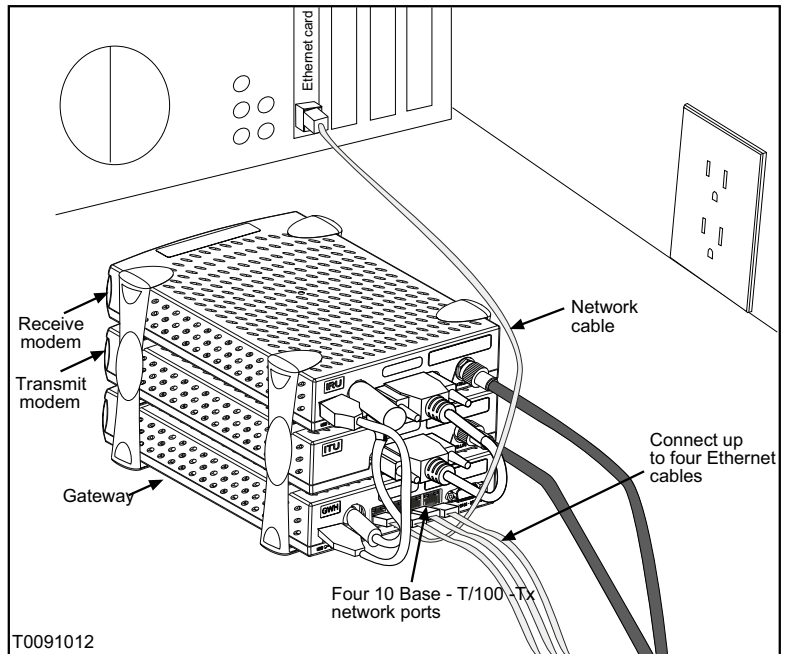

Figure 60: Attach network cables

9. Attach the power supply cords to the power supply and to the power supply adapter. Ensure that the power cord is tightly connected to the power supply, modem, and Gateway (see Figure 61). The final assembly is shown in Figure 62.
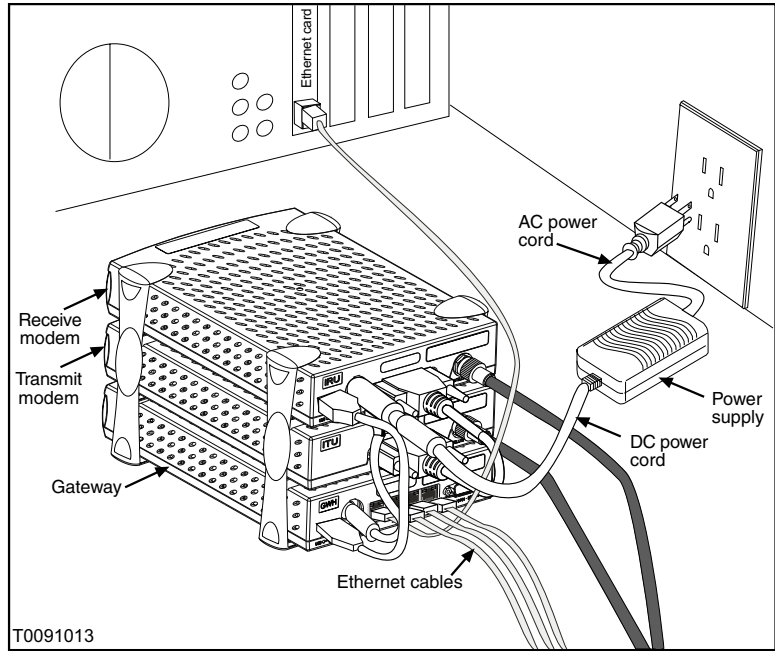
Figure 61: Connect power cord

Figure 62: Final assembly

Powering up and reading the DW4020 LED display

After you have assembled the DW4020, plug it into a 110 V wall outlet, power strip, or surge protector. The Gateway LED display will cycle as shown in Table 12. The cycling completes in less than a minute.

Note: In countries outside North America, the DW4020 may be plugged, with a physical adapter, directly into a 220 V outlet. Different countries may have different standards and requirements.

The transmit and receive modems have their own LEDs, which show their status. These are described in *The DW4020 LEDs* on page 86.

Note that normal Gateway operation alone doesn't imply normal *DW4020* operation. The installation and commissioning process may not have been completed or software download (DLL) from the Network Operations Center (NOC) may not have been completed. Additional status information is available via the User Interface. See Chapter 3 – *The User Interface,* on page 33) and the LEDs on the receive and transmit modems (see *Communicating with the Gateway through the serial port* on page 95).

Table 12: Gateway LED cycling at startup

LED condition	STATUS LED	READY LED
Off	Power off	Power off or startup diagnostics not yet run successfully
Steady Green	Normal operation	Running software downloaded from NOC; successfully commissioned
Blinking Orange	Contact between GWH and IRU over USB not established; USB cable not installed or some other USB problem	Not applicable
Blinking Green	Not applicable	Not commissioned
Steady Red	Power on tests	Not applicable

The DW4020 LEDs

The receive and transmit modems have LEDs on their front panels. Both modems have a green **READY** LED. The receive modem has a green **RX** LED. The transmit modem has a green **TX** LED. The LEDs' status indicate various conditions. Table 13 describes the basic states.

The LEDs may also indicate various conditions through *blink patterns.* Tables 7 and 8 explain these. The numbers in brackets are the status codes discussed in *The System Status indicator* on page 36.

If the modem does not appear to be functioning, check all cable connections. If they are secure, cycle the power by unplugging the power cord at the power supply and plugging it back in. A number of conditions and corrective actions are described below.

The **READY** LEDs should come on steadily when the DW4020 is powered up and when it is operating. The **TX** and **RX** lights can also blink when the DW4020 is first powered up, or when the DW4020 is power cycled. However, that blinking does not indicate anything about their status.

Table 13: Basic Receive and Transmit Modem LED States

	Ready OFF/RX OFF	**Ready ON/RX Off**	**Ready ON/RX blinking**
Receive modem	Modem not functioning	Modem functioning, no data being received	Modem functioning, data being received
	Ready OFF/TX OFF	**Ready ON/TX Off**	**Ready ON/TX blinking**
Transmit modem	Modem not functioning	Modem functioning, no data being transmitted	Modem functioning, data being transmitted

The DW4020 is extremely reliable. If you find you cannot surf the Internet or the DW4020 seems to have a problem, follow this sequence of steps below to identify and fix the problem.

- *Check whether the DW4020 LEDs or on or off.* The LEDs may indicate that a connection has become loose. Reconnecting a cable or power cord may restore function. See *DW4020 LEDs status*.
- *Check if the LEDs are blinking in a pattern.* The LEDs can blink in a pattern. The patterns correspond to the receive and transmit status codes discussed in *Transmit Status messages* on page 37 and *Receive Status messages* on page 42. See *LED blinking indicating status codes* on page 60 for a discussion of the blinking LEDs.

- *Check if the LEDs on the back of the Gateway or on or off.* The LAN ports on the back of the Gateway have LEDs. See *Ethernet port LEDs* on page 94.
- *Contact Customer Care.* If the corrective actions described in this chapter and *Chapter 3 – The User Interface* do not solve the problem, contact technical support.

The DW4020 LEDs

The receive modem has a RX and a READY LED. The transmit modem has a TX and a READY LED. The Gateway has a STATUS and READY LED.

Note: Whenever the LEDs do not function properly as described below, check to be sure you have the correct power supply, PN 1031105-0001.

DW4020 LEDs status

This section describes the LEDs' appearance during typical DW4020 operation. It also describes their appearance when some basic problem is occurring.

Normal operation, no transmit or receive

When the DW4020 is powered on but not receiving or transmitting data, it appears as shown in Figure 63. The modems' READY LEDs are continuously lit. Both the Gateway LEDs are continuously lit.
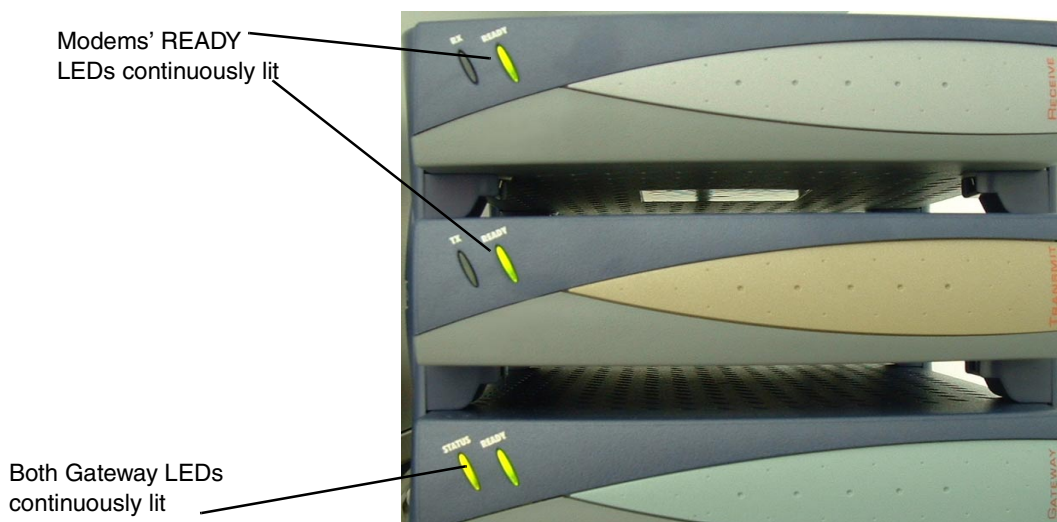

Modems' READY LEDs continuously lit

Both Gateway LEDs continuously lit

Figure 63: DW4020 normal operation, no data received or transmitted

Normal operation, data being sent and received

During normal DW4020 operation, the modems' READY LEDs are continuously lit, the RX and TX LEDs blink as they pass data, and both the Gateway LEDs are continuously lit, as shown in Figure 64.

RX LED blinks as modem passes data; READY LED on continuously

TX LED blinks as modem passes data; READY LED on continuously

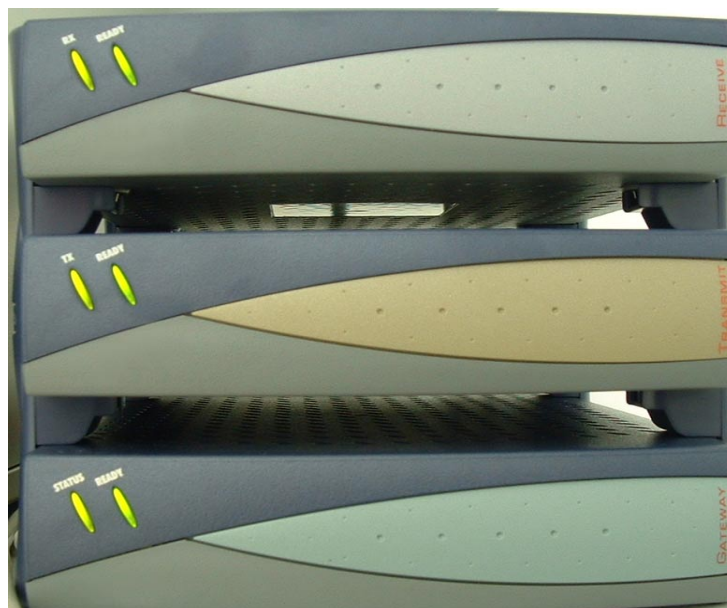Gateway STATUS and READY LEDs continuously lit

Figure 64: Normal operation, data being sent and received

Problem: receive modem READY LED not on

If the DW4020 is not operating normally and the receive modem's READY LED is not lit, as shown in Figure 65, take the following steps:

- Check to make sure the power cord is securely attached to the receive modem and plugged into the wall outlet or surge protector. See Figure 66. If the power cord was loose, the receive modem READY led will come on when power is restored.
- If securing the power cord does not solve the problem, check all cable connections. Tighten any that seem loose.
- If the Receive modem READY LED still does not come on, power cycle the DW4020 by unplugging the power cord from the wall outlet or surge protector, waiting ten seconds, and plugging it back in.
- If the problem persists, contact technical support.

Note: Often, if the receive modem READY LED is not lit, the other modem LEDs will not be lit either.

Receive modem READY LED not lit. Note that in many cases other modem LEDs will not be lit either.
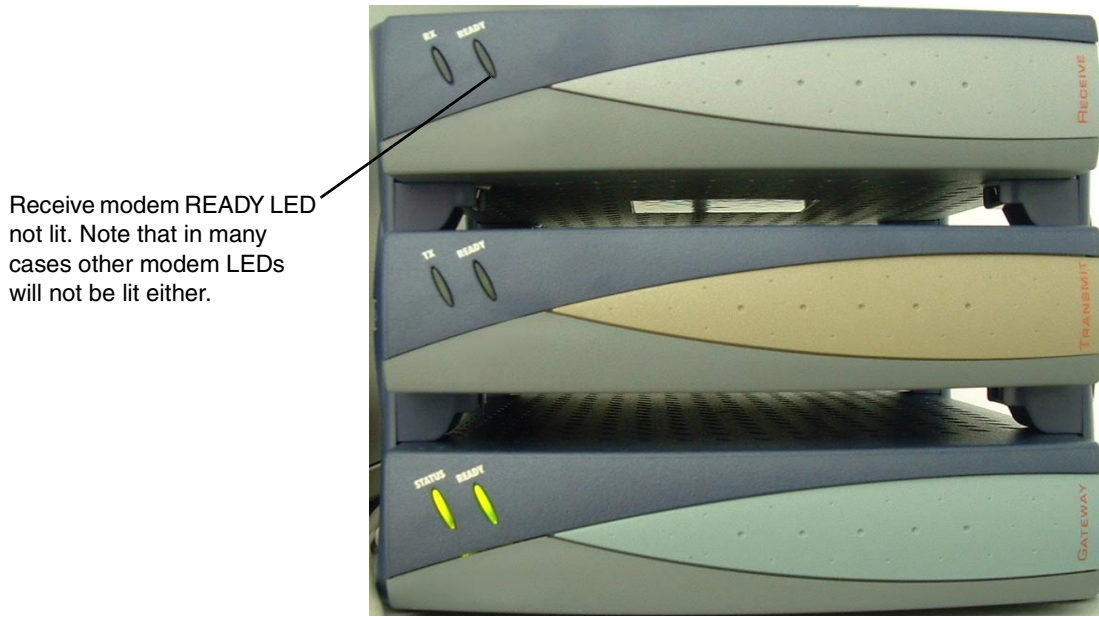
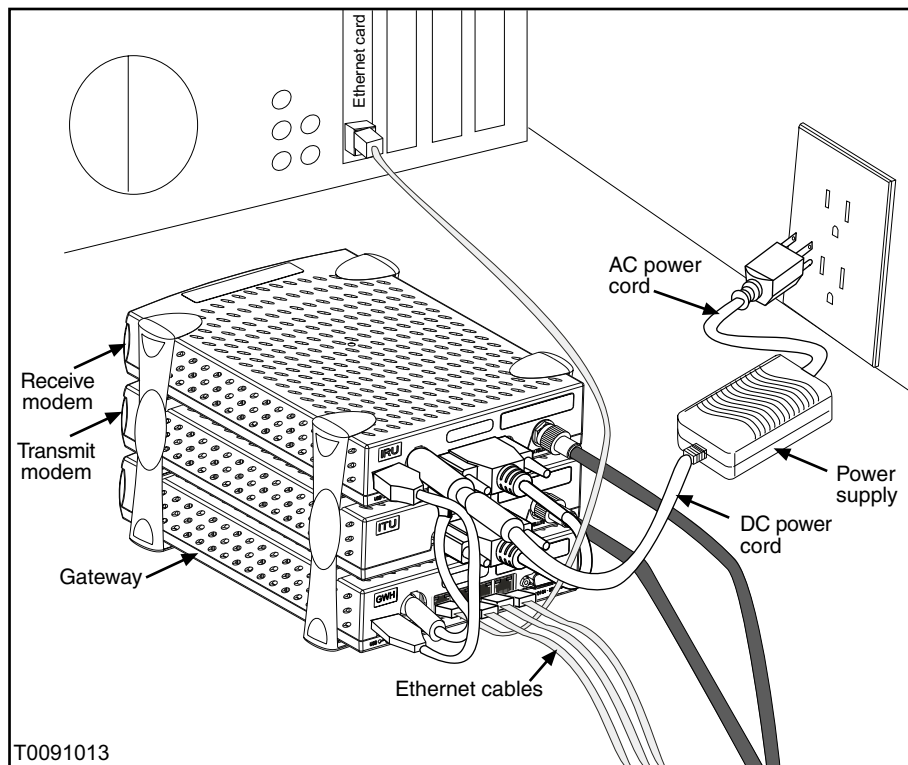Figure 65: Receive modem READY LED not lit

Figure 66: DW4020 power and cable connections

Transmit modem READY LED not lit   If the transmit modem is not operating normally and its READY LED is not lit, as shown in Figure 67, take the following steps.

- Check that the receive modem READY LED is continuously lit. If not, try the sequence in *Problem: receive modem READY LED not on* on page 88.
- Check that the 25-pin connector is attached securely. See Figure 66.
- Check to make sure the power cord is securely attached to the receive modem and plugged into the wall outlet or surge protector. See Figure 66. If the power cord was loose, the transmit modem READY led may come on.
- If securing the power cord does not solve the problem, check all cable connections. Tighten any that seem loose.
- If the transmit modem READY LED still does not come on, power cycle the DW4020 by unplugging the power cord from the wall outlet or surge protector, waiting ten seconds, and plugging it back in.
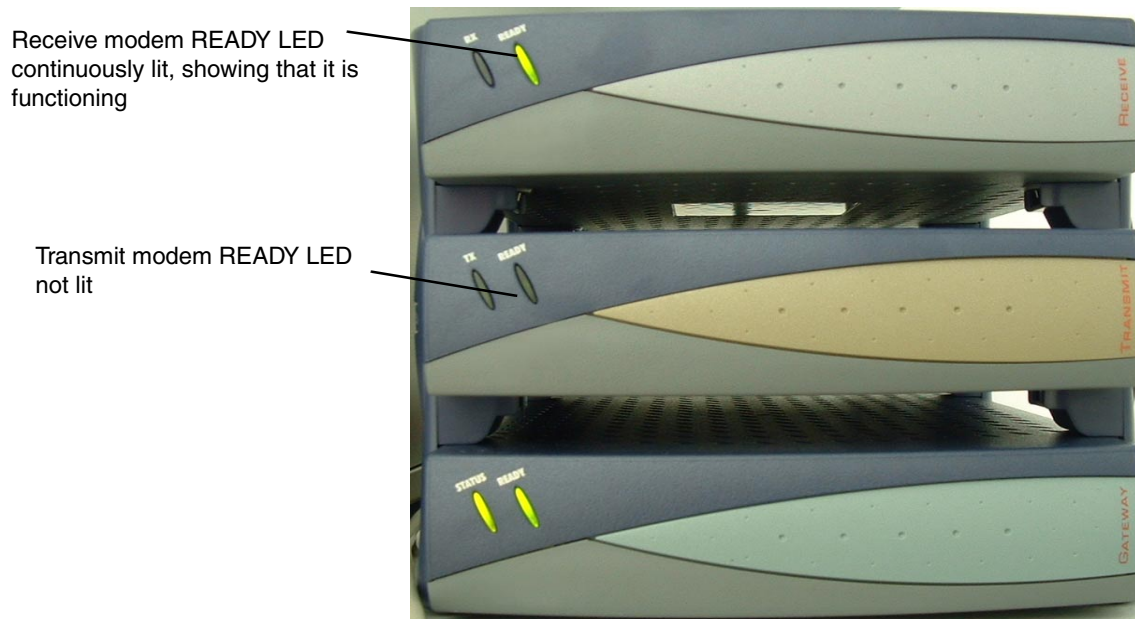- If the problem persists, contact technical support.

Receive modem READY LED continuously lit, showing that it is functioning

Transmit modem READY LED not lit

Figure 67: Transmit modem READY LED not lit

Gateway LEDs not lit If the Gateway does not seem to be functioning and its LEDs are not lit, and the receive modem READY LED blinks as shown in Figure 68, take the following steps.

- Check to make sure the power cord is securely attached to the Gateway and receive modem and plugged into the wall outlet or surge protector. See Figure 66. If the power cord was loose, the Gateway and receive modem READY LEDs will come on when power is restored.
- If securing the power cord does not solve the problem, check all cable connections. Tighten any that seem loose.
- If the Gateway READY LED still does not come on, power cycle the DW4020 by unplugging the power cord from the wall outlet or surge protector, waiting ten seconds, and plugging it back in.
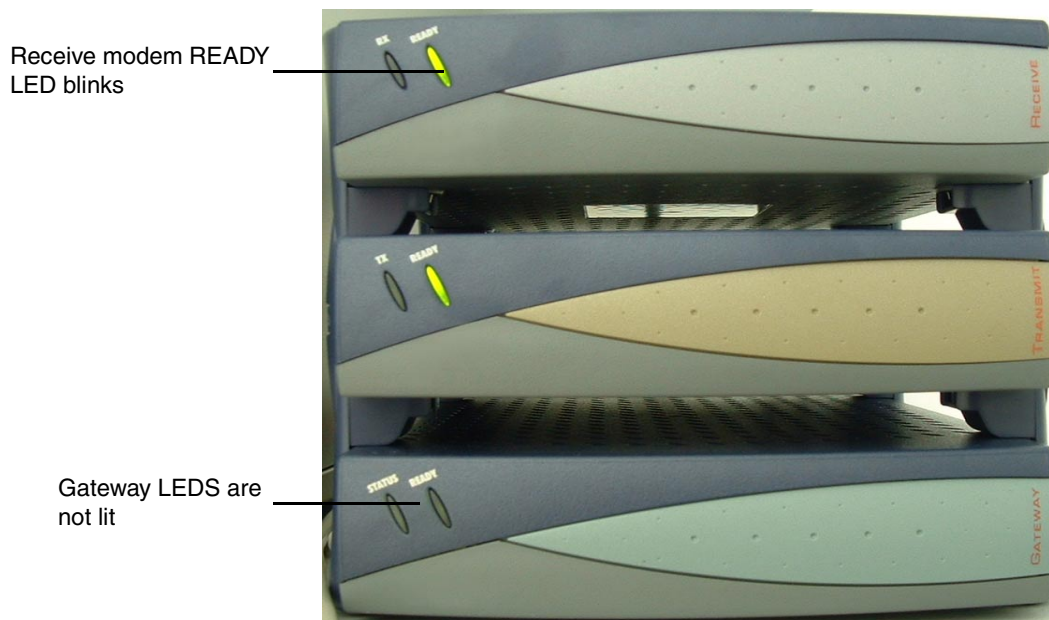- If the problem persists, contact technical support.

Figure 68: Gateway LEDs not lit

Gateway LEDs flash, receive modem READY LED off or flashing

If the Gateway does not seem to be functioning and its STATUS LED flashes amber, and the receive modem READY LED blinks or is not lit, as shown in Figure 68, take the following steps.

- Check to make sure the USB cable is securely attached to the Gateway and receive modem. See Figure 66. If the cable was loose, the Gateway and receive modem READY LEDs will come on when it is reattached.
- If securing the USB cable does not solve the problem, check all cable connections. Tighten any that seem loose.
- If the Gateway STATUS LED still does not come on continuously, power cycle the DW4020 by unplugging the power cord from the wall outlet or surge protector, waiting ten seconds, and plugging it back in.
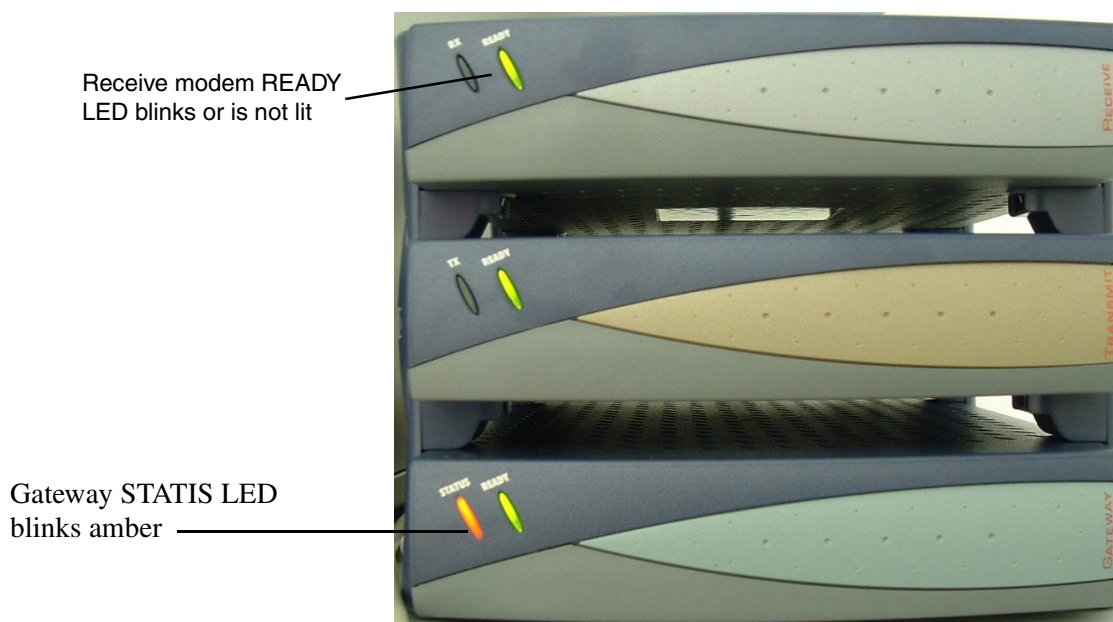- If the problem persists, contact technical support.

Receive modem READY LED blinks or is not lit

Gateway STATIS LED blinks amber

Figure 69: Gateway STATUS LED blinks amber

LED blinking indicating status codes

The DW4020 modems' READY LEDs can blink in various patterns. These patterns correlate to the status codes discussed in *Transmit Status messages* on page 37 and *Receive Status messages* on page 42. If you can see the patterns, you also have access to the **User Interface**. It will be easier to find out what the status of the DW4020 is via the interface than the LED status

blinking. The blink patterns are described below for your information.

Transmit READY LED Pattern	Corresponding transmit status messages
Off	4 (or powered off)
On	8
2 Long, 1 Short	1
2 Long, 2 Short	2
2 Long, 3 Short	11
1 Long, 1 Short	3
1 Short	5
2 Short	10, 13, 14, 15, 16, 21, 22, 23
3 Short	6, 7
4 Short	12, 17
Slow Alternating	9,18,19,20
Fast Alternating	The ITU interface testing – This is a continuous fast blinking pattern, with the Transmit LED being the inverse of the Ready LED. No corresponding message.

Receive READY LED Pattern	Corresponding receive status message
Fast Alternating	Prior to downloading software– This is a continuous fast-blinking pattern, with the RX LED being the inverse of the Ready LED. No corresponding message.
Slow Alternating	1
On	5
1 Long, 1 Short	3,6
1 Long, 2 Short	4,7
1 Short	0
1 Long, 1 Short, 1 Long	2

Table 14: Receive modem READY LED blink patterns

Ethernet port LEDs

Each of the four Ethernet ports on the DW4020 has two LEDs associated with it. One LED is green and one is yellow. See Figure 70.

The green LED will be on if power is applied to the DW4020 and a 100baseT Ethernet device is connected to the corresponding Ethernet port. Otherwise, the green LED will be off.

if the power is on and the light is off while a network device is connected, then the device is a 10baseT device and the port is autosensing.

The yellow LED will also be on when power is applied to the DW4020. It will flash momentarily when there is LAN activity on the corresponding Ethernet port.

Figure 70: Ethernet port LEDs

Communicating with the Gateway through the serial port

After the Gateway finishes the LED sequence, you will use a laptop PC to communicate with the Gateway via a serial cable. (You can also use a desktop PC.) You access the Boot Parameters screen and set the parameters. You also point and cross-pol the antenna. In order to complete the parameters, you will need your installer ID and the information shown in Figure 80 on page 102.

Connecting the Gateway and laptop

1. Attach one end of a 9-pin F-F (female/female) null modem serial cable to the serial port on your PC.
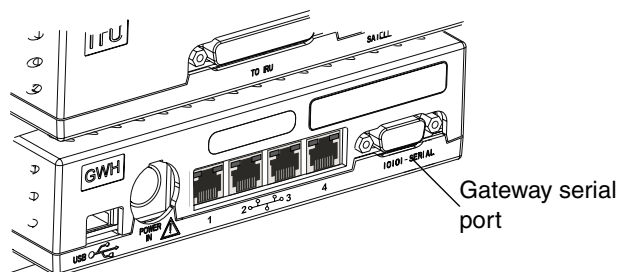2. Attach the other end of the cable to the Gateway serial port (see Figure 71).

Gateway serial port

Figure 71: Location of Gateway serial port

Configuring Hyperterminal or terminal emulation program

3. Run Hyperterminal or a similar terminal emulation program to access the Gateway software **Main Menu**. The first time you do this, you configure the COM1 port's properties and save the connection as a Hyperterminal *.ht* file. For all subsequent installs, you simply open the file.

Note: You can often find the Hyperterminal icon in the Accessories subfolder in the Windows Start menu. If you cannot find it there, go to *Start→Find→Files or Folders* and search for Hyperterminal. Windows will find the Hyperterminal folder. Open it and click on *Hyperterminal.* The program will run. If Windows does not find Hyperterminal you must install it. Go to *Control Panel→Add/Remove Programs→ Add/Remove Programs Properties* and select the tab for the version of Windows you use. Click the Communications checkbox. Click **Details** to make sure the Hyperterminal checkbox is checked; if it is not, check it and click OK. Click OK in the Add/Remove Programs Properties box. Windows should install Hyperterminal.

a. Select *Start→Accessories→Hyperterminal* and click on the `Hyperterminal` file (see Figure 72). The *Connection Description* window appears (see Figure 73). The red and yellow phones icon is highlighted in blue. You will establish a new connection.

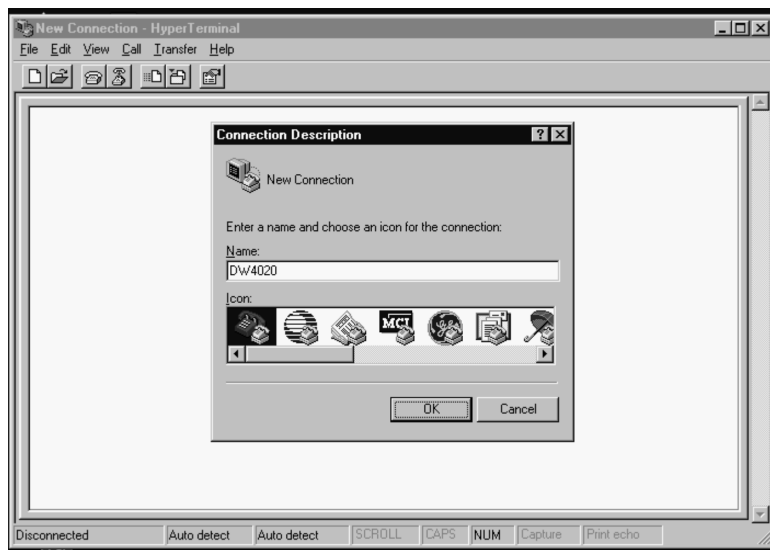Figure 72: Starting Hyperterminal

Figure 73: Connection Description window

b. Enter **DW4020** in the New field.

c. Select **OK.** The *Connect To* window appears.

d. Select **COM1** from the *Connect Using* pull-down list (see Figure 74). (Select **COM2** is you want to use that port.)
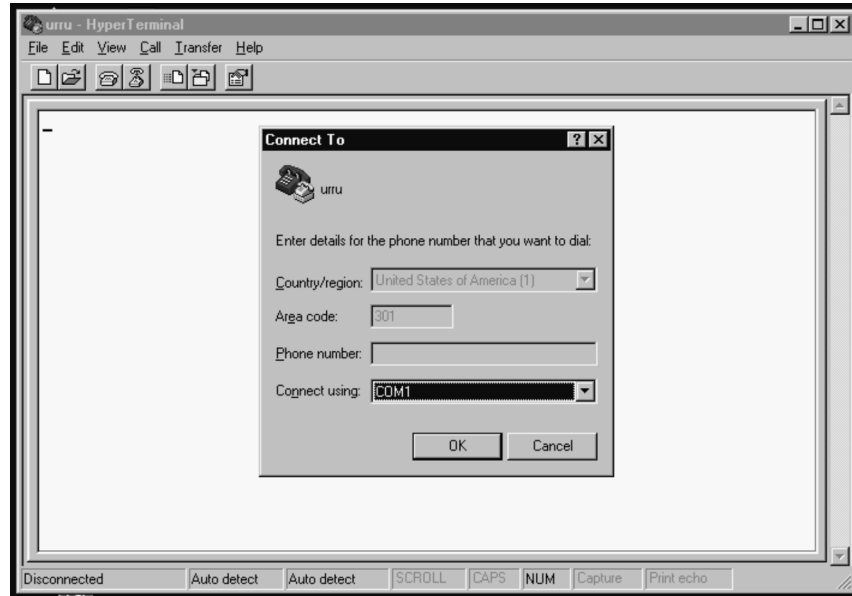

Figure 74: Connect To window

e. Select **OK.** The *COM1 Parameters* window appears.

f. Configure the Port Settings by selecting the parameters below from the appropriate pull-down list (see Figure 75).

  – Bits per second (baud): 9600

  – Data bits: 8

  – Parity: none

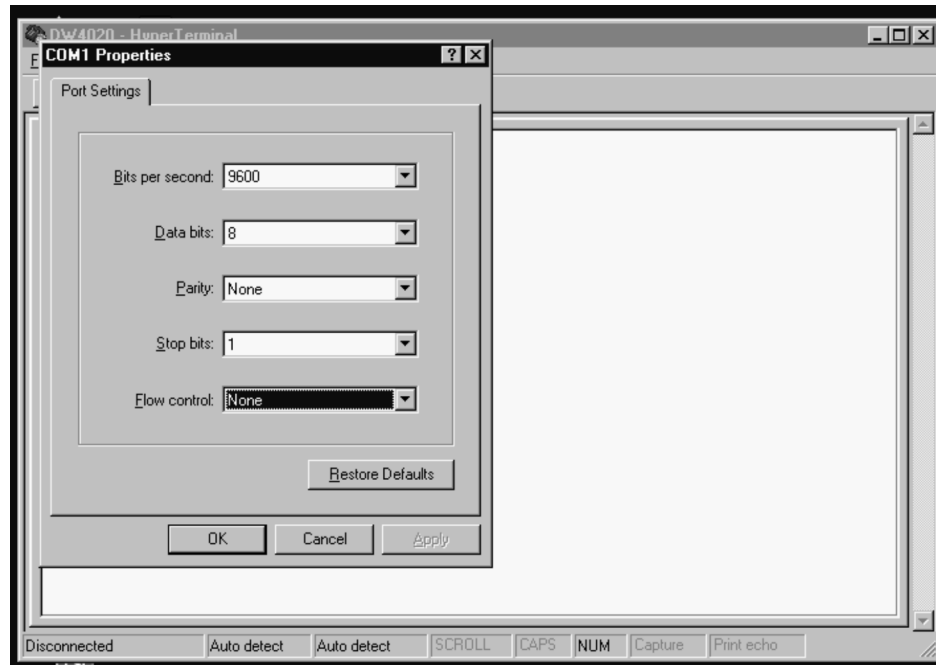 – Stop bits: 1

  – Flow control: none

Figure 75: COM1 Properties window and pull-down menus

g. Select **OK.** The window disappears.

h. Select *File→Save As.* The *Save As* window appears.

i. Enter **DW4020** in the File name field and select **Save.** The window disappears. Now you will simply be able to select the *DW4020.ht* file when connecting the Gateway and the laptop during future installs.

j. Select *Call→Connect.* The laptop will connect to the Gateway.

4. Press **ENTER** at the Hyperterminal prompt to display the initial Install Console screen shown in Figure 76.
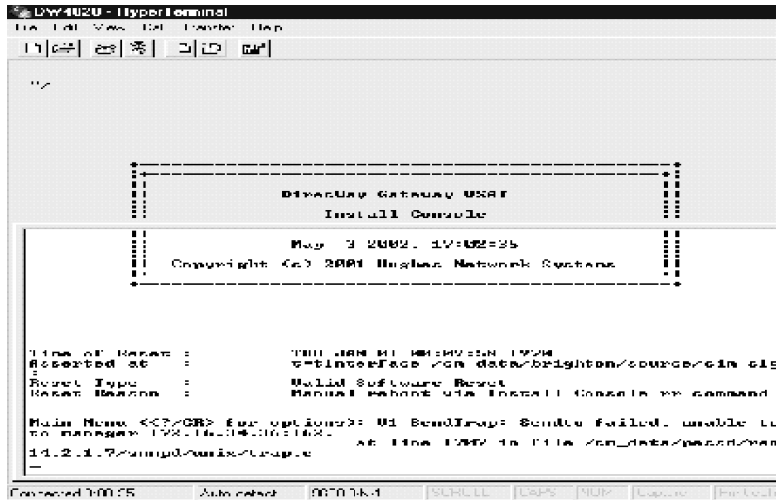

Figure 76: Initial Install Console screen

✍ Note: For all future Gateway installations, use the DW4020.ht file you saved to connect the Gateway and laptop. Start Hyperterminal. Select *File→Open→DW4020.ht.* The Gateway and laptop will connect.

5. Press **ENTER** to display the **Main Menu** shown in Figure 77.

```
Main Menu:
    (a)   Configure Boot Parameters
    (b)   Display Current Configuration
    (c)   Display Satellite Interface Statistics
    (d)   Display Active Routing Table
    (f)   Run Software Download Monitor
    (h)   Display Reset History
    (i)   Installation

    (t)   Run Final/Built-in Tests


    (pc) (Parameter Clear)      Clear Configuration
    (pw) (Parameter Write)      Write Configuration
    (rr) (Gateway Reset)        Reset the Gateway
    (rd) (Gateway Deconfigure) Force Download and
Acquire New Keys
```

Figure 77: BOOT ROM installer console Main Menu

6. Enter **c** to display the **Satellite Interface Statistics** menu (see Figure 78).

```
Main Menu (<?/CR> for options): c

Satellite Interface Stats Menu:
    (a) Display Main Statistics.
    (b) Clear Statistics.
    (c) Display Satellite Interface Serial Number.
    (d) Display Signal Quality Factor.
    (g) Display PEP Statistics.
    (z) Return to Main Menu.

Satellite Interface Stats Menu (<?/CR> for options): c


Satellite interface serial number: 647938
```

Figure 78: Satellite Interface Statistics menu with Display Satellite Interface Serial Number displayed

7. Enter **c** to display the satellite interface serial number (see Figure 78).
   If the electronic serial number is different from the barcode receive modem serial number, call the installer hotline for the DW4020 series and request the serial number be corrected. You must supply the Site/Master account number that can be found on the work order. Also observe all cautions in the Caution box below.

8. Enter **z** to return to the **Main Menu**.

CAUTION

- **You must confirm the receive modem electronic serial number through the serial connection using Hyperterminal when configuring the DW4020.**
- **If the electronic serial number is different from the barcode receive modem serial number, call the installer hotline for the DW4020 series and request the serial number be corrected. You must supply the Site/Master account number that can be found on the work order.**
- **Do not use any other receive modem at the site unless instructed by HNS personnel. If the wrong modem is brought to the pre-configured site, delays can occur due to re-configuration issues in the NOC.**

Configuring Boot Parameters

Use Configure Boot Parameters to configure the Gateway for outroute reception and downloading of software. For initial installation, most parameters must be entered, except for VSAT Return Path, which is always "Inroute."

Thus, you will need your installer ID, and you will need all necessary information to enter data for the fields marked with an asterisk in Figure 80. One asterisk means the installer must provide or obtain the information; two asterisks means the information is global for all installations. Refer to Appendix A for information on how to determine how to convert degrees/decimal values to degree/minutes values.

Note: Two good Web sites for determining your latitude and longitude include: http://www.zipinfo.com/search/zipcode.htm and http://www.census.gov/cgi-bin/gazetteer

Note: If you will be using the Outdoor Pointing Interface (OPI) device, remember that the LNB 22KHz Switch parameter must be set to "OFF" to enable the device. You may leave the parameter at OFF for the rest of the installation. The instructions below describe how to set parameters.

1. Enter **a** at the **Main Menu** prompt. Each parameter shown in Figure 80 appears, one at a time, one line at a time. For example, the first parameter to appear after you enter **a** is the VSAT Return Path Parameter, as shown in Figure 79.

.

VSAT Return Path (1 = Receive Only, 2 = Inroute, 3 = LAN) <2>:

Figure 79: VSAT Return Path Parameter

All the parameters are shown in the *Display Current Configuration* screen in Figure 80. The screen is displayed by entering **b** at the **Main Menu** prompt.

```
Creation Date:                        Feb  8 2002, 11:43:08
Current Gateway Image Executing:      Main.bin
IRU Software Version Number:          33
======================================================================
Parameter                             Value entered       Value in use
--------------------------------------  --------------      ------------
VSAT Return Path:                     **Inroute             Inroute
Satellite Longitude in degrees:       **117                117
Satellite Longitude in minutes:       **0                  0
Satellite Hemisphere:                 **West               West
VSAT Longitude in degrees:            *77                  77
VSAT Longitude in minutes:            *10                  10
VSAT Longitude Hemisphere:            *West                West
VSAT Latitude in degrees:             *39                  39
VSAT Latitude in minutes:             *10                  10
VSAT Latitude Hemisphere:             *North               North
Satellite Channel Frequency:          *11100 (x 100Khz)  11100 (x 100Khz)
Receive Symbol Rate:                  *30000000 Sps        30000000 Sps
LNB Polarization:                     *Vertical            Vertical
LNB 22KHz Switch:                     *On                  On
Filter Rolloff:                       *20                  20
LAN1 IP Address:                      *66.82.56.50         66.82.56.50
LAN1 Subnet Mask:                     *255.255.255.240   255.255.255.240
IP Gateway IP Address:                *66.82.24.154        66.82.24.154
SDL Control Channel Multicast Address: *224.0.1.4           224.0.1.4
VSAT Management IP Address:           *10.0.0.0            10.0.0.0
Default Router IP Address:            10.0.0.10            10.0.0.0
Main Menu (<?/CR> for options):
```

Figure 80: Display Current Configuration Screen

2. As each one-line parameter appears, enter the specific values as defined in the installation specification for this customer or as specified by HNS personnel and press **ENTER**. The next parameter will then appear.

Type **-** and press **ENTER** at the prompt to go to the previous parameter. You can also skip the remaining parameters by typing **** and pressing **ENTER**.

Note: The Default Router Address isn't used in most cases and doesn't have to be configured. The VSAT Return Path should be configured to "Inroute."

Note: The values in the examples are for illustrative purposes only. Do not use them to configure the Gateway.

3. When you have entered all parameters, return to the **Main Menu** and enter **pw**. This saves the configuration parameters to the flash memory. At this point, depending on the parameters that were modified, the Gateway may reset.

4. A message `Writing the configuration -are you sure (y/n)` appears. Enter **y**. At this point, depending on the parameters that were modified, the Gateway should reset. If it does not reset, enter **rr** to do a Gateway reset.

5. At the **Main Menu** prompt, enter **b** to display the current configuration. The display is similar to the one shown in Figure 80. Verify the parameter values and match them to the installation or NOC specification.

The Installation Menu After you have entered the boot parameters, use the **Installation Menu** to receive and transmit point the antenna. Transmit pointing uses both an automatic and manual mode.

The Outdoor Pointing Interface (OPI) device can also be used to point an antenna used with a DW4020. Follow the instructions in the ***Outdoor Pointing Interface Operating Instructions*** (HNS 1031832-0001).

Note: Remember that if you use the OPI, the LNB 22KHz Switch parameter must be set to "OFF." You may leave the parameter set at "OFF" for the rest of the installation.

Note: Remember that if you wish to exit the Installation Menu and return to the Main Menu, you must type "**z**" and press **ENTER**. If you don't you'll remain in one of the Installation submenus until you do so.

⚠ **CAUTION**

- **The two-way satellite dish assembly emits radio frequency energy when in the transmit mode.**
- **Unplug indoor power connection before performing maintenance or adding upgrades to any satellite dish components.**
- **To avoid risk of injury, do not place head or other body parts between feed horn and reflector when system is operational.**

Prohibited area
(when operational)
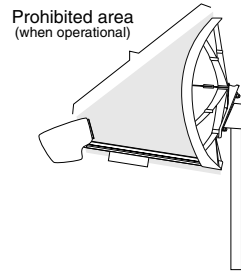
Antenna Pointing - Receiver This section describes how to verify adequate receive signal reception, that is, with a signal quality factor (SQF) of over 30.

1. Enter **i** at the **Main Menu** prompt. The **Installation Menu** appears (see Figure 81). Enter either your installer ID number or <CR>, which defaults to a valid installer ID, to access the submenus. If automatic cross-polarization (ACP) is not available, "Transmitter, Automatic (not available" will appear in the menu.

```
Installation Menu:
   (a) Antenna Pointing - Receiver
   (b) Antenna Pointing - Transmitter, Automatic
   (c) Antenna Pointing - Transmitter, Manual
   (d) Verify Ranging
   (z) Return to Main Menu
```

Figure 81: Installation Menu

2. At the **Installation Menu** prompt, enter **a** to obtain antenna pointing values and assigned satellite parameters. The *Antenna Pointing - Receiver* screen in Figure 82 appears.

Figure 82: Antenna Pointing - Receiver

The SQF represents the strength of the received signal relative to noise. SQF is an integer value between 0 and 99. The SQF value is interpreted as follows:

– **0-29.** The receive modem is **not** locked onto the desired signal. The value increases as the Gateway receives stronger signal power.

– **31-99.** The receive modem is locked onto the desired satellite signal.

– **30.** The receive modem is locked onto a satellite signal, but is waiting for a message confirming that it is locked to the correct signal. An unchangeable value of 30 indicates that the receive modem is locked onto a wrong signal.

3. If the SQF is less than 30, refine the antenna pointing to bring the SQF over 40 and to as close to 99 as possible. The SQF message updates automatically. There is a delay of up to 10 seconds between the displayed and the current SQF value.

4. If you cannot achieve a satisfactory SQF, take the steps below in the order suggested until the situation is corrected.

a. Check for unobstructed view to the satellite.

b. Refine antenna aiming.

c. Check LNB polarization.

d. Check receive symbol rate.

e. Replace LNB.

f. Replace entire DW4020 unit.

Antenna Pointing - Transmitter, Manual

The manual cross-polarization function can be used to adjust the antenna and peak the antenna's transmit polarization for maximum isolation. You can also use manual pointing to adjust polarization after failing the automatic cross-polarization test.

1. Enter **C** at the **Installation Menu** prompt. The *Antenna Pointing - Transmitter, Manual* screen appears.
   Otherwise, the screen shows the current queue position until the test can be run. When the Test Status field shows `Active` the test can be run. The result of the test is shown in the Result: field, where a transmitter isolation value is reported.

2. Make small, one-degree or less changes in polarization while observing the transmitter isolation. Peak the transmitter to the highest possible transmitter isolation value.

3. Press **Enter** to return to the **Installation Menu**.
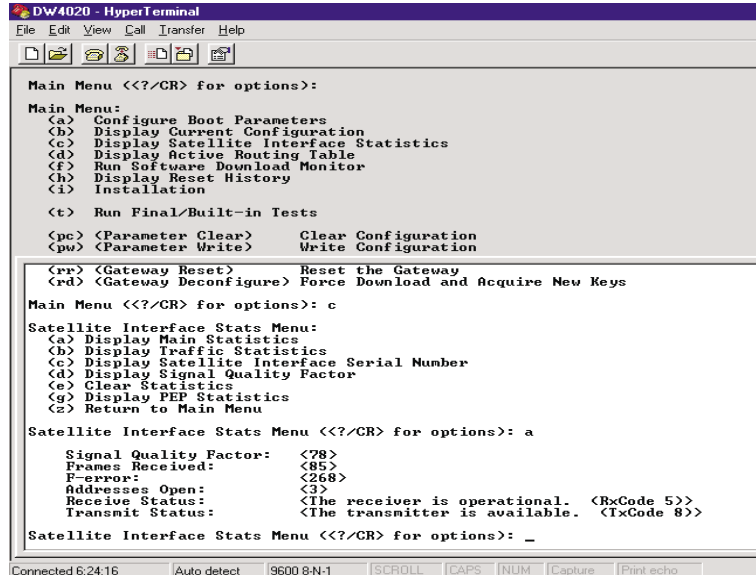
Antenna Pointing - Transmitter, Automatic

Automatic cross-polarization (ACP) is used for a rapid Pass/Fail test of the antenna's transmit polarization adjustment. If you pass ACP the unit is enabled and no further antenna pointing is needed.

1. Enter **B** at the **Installation Menu** prompt. The *Antenna Pointing - Transmitter, Automatic* screen appears.
   Otherwise, the screen shows your current queue position until the test can be run. (Sometimes a number of installers will be pointing their antennas at the same time. You may have to wait for the test to be run, and are placed in a queue until it can be run.)
   The result of the test is shown in the Result: field. `PASS` means the transmit modem will be enabled and the system should be operational. `FAIL` means the transmit modem will be disabled and the dish pointing needs to be checked.

2. Whether you pass or fail, press **Enter** to return to the **Installation Menu**.

3. Enter **z** to return to the **Main Menu**.

4. At the **Main Menu** enter **c**. The **Satellite Interface Statistics Menu** appears (see Figure 83).

5. Enter **a**. The *Display Main Statistics* screen appears. Confirm the SQF is greater than 31 and that the transmitter is available.

6. Enter **z** to return to the **Main Menu**.

CAUTION

Any time you enter the DW4020 Installation Menu, the transmitter is turned off for safety reasons. Do not enter "I" to access the Installation Menu after this point unless instructed to do so by a technician at the NOC.

Figure 83: Display Main Statistics

Range value Ranging may have to be initiated by the NOC to adjust for differences in delay due to distance to the satellite. Check your installation specification to see if this is necessary.

To learn if ranging is available and being used by the unit, enter **d**. If it is available and used, SUCESSFUL will appear; if not, NEED RANGING will appear.

Ranging must be done before you exit the **Installation Menu.**

Verifying software download

If the Gateway is configured correctly for outroute reception and SQF is greater than 30, it will acquire the outroute. As soon as the Gateway acquires the outroute, it begins to look for the Hub Server in the data stream to perform software download.

1. To monitor software download (SDL) progress, enter **f** at the **Main Menu** prompt to select *Software Download Monitor*.
2. The following message is displayed at the bottom of the screen:

```
SDL Initialization complete. Awaiting first heartbeat msg.
```
This message is dynamically updated. It indicates that SDL has started and is waiting to connect with the hub server.

Note: It may be 20 minutes before the first heartbeat message is received.

3. If SDL does not progress beyond this message, check the following:
- The SDL control channel's multicast IP address
  - Return to the **Main Menu**.
  - Enter **b** to view the current configuration
  - Check that the SDL Control Channel Multicast Address is correct. If not, enter the correct address.
- The **Ready** lights to ensure they are on. See *The DW4020 LEDs* on page 86 and *Communicating with the Gateway through the serial port* on page 95.
4. When the Gateway receives a message from the Hub Server, the following message is displayed:

```
Received first heartbeat message.
```
5. If there is no progress beyond this message, check the return path. When operating normally, the following message is displayed:

```
Received File/Group message. Reconciling files...
MM loading...
IP loading...
...
All files downloaded. Notifying CFM.
```

6. On successful download, the Gateway automatically resets to reflect the new software. The new configuration takes effect.
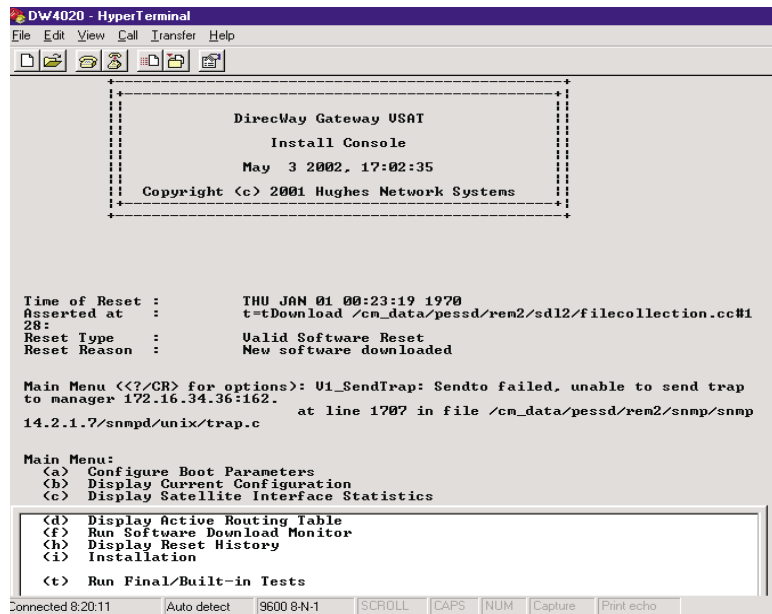

Figure 84: Gateway reset

7. At the **Main Menu** prompt, select **f** to monitor SDL progress. The following messages are displayed:

```
SDL Initialization complete. Awaiting first heartbeat msg.
Received first heartbeat message.
All files downloaded. No pending changes.
```

The DW4020 may now be hooked up to either a configured PC or network.

DW4020 status information via the serial port

The DW4020 has no serviceable parts. However, you may be able to debug units with help from the network operations center (NOC). You access the menus below via the serial port, just as when you set up the DW4020.

Verifying correct DW4020 operation

You can verify that the DW4020 unit is receiving and processing data by following the steps given below.

1. Enter **A** at the Main Menu to access **Satellite Interface Statistics**.
2. At the Satellite Interface Stats submenu enter **A** to select **Display Main Statistics**. In the display that appears (see Figure 85), check if frames are being accepted.

```
Signal Quality Factor:    <83>
    Frames Received:          <181>
    F-error:                  <0>
    Addresses Open:           <2>
    Receive Status:           <The receiver is operational.  (RxCode 5)>
    Transmit Status:          <The transmitter is available.  (TxCode 8)
```

Figure 85: Display Main Statistics

The Frames Received and F-error values indicate the DW4020 is detecting frames and correctly receiving and demodulating an outroute signal.

Note the Signal Quality Factor is also reported; if the SQF is below 31, the antenna must be repointed.

The Receive Status and Transmit Status fields report whether the receive and transmit modems are operational. If they are not operational or available, antenna pointing is not possible.

The Rx and Tx codes have the same meanings as explained in the LED flashing code tables above.

Displaying traffic statistics At the Satellite Interface Statistics submenu enter **B** to select **Display Traffic Statistics**. The screen in Figure 86 appears.

```
aam info
------------------------------------------------------------
state             dpcmac   ethmac         key
----------------- -------- -------------- ----------------
ADDR_RESERVED  (4) 5E6EEFEF 01005E6EEFEF 0000000000000000
ADDR_UNICAST   (8) 0A0B36E3 02000A0B36E3 DFCFA55F949BA608
ADDR_CLOSED    (5) 5E000104 01005E000104 0000000000000000
MacAdrs        RxOk       RxCrc      RxLost     BadKey
------------ ---------- ---------- ---------- ----------
000000000000 0000000000 0000000000 0000000000 0000000000
02000A0B36E3 0000000171 0000000000 0000000000 0000000000
01005E6EEFEF 0000000012 0000000000 0000000000 0000000000
030001000009 0000007651 0000000000 0000000000 0000000000
030001020000 0000000476 0000000000 0000000000 0000000000
030001010000 0000001419 0000000000 0000000000 0000000000
```

Figure 86: Display Traffic Statistics screen

Displaying PEP statistics To check performance enhancing proxy (PEP), at the Satellite Interface Statistics submenu enter **G** to select **Display PEP Statistics**. The screen in Figure 87 appears.

```
TCP Spoofing Flag           :Disabled
   Rx PBP                      :3
   Rx PBP Bad Checksum         :0
   Tx PBP                      :0
   Rx TCP                      :0
   Rx TCP Bad Checksum         :0
   Rx TCP Spoofed              :0
   Rx TCP SYN Unspoofed        :0
   Rx TCP Unspoofed            :0

   Priority                    1         2         3         4
   PBP Status                  Closed    Closed    Closed     Closed
   PBP Rx Pkts                 0         0         0         0
   PBP Tx Pkts                 0         0         0         0
   PBP Rx SACK                 0         0         0         0
   PBP Tx SACK                 0         0         0         0
   PBP Rx RST                  0         0         0         0
   PBP Tx RST                  0         0         0         0
   PBP Snd/Rcv Win             0/   0    0/   0    0/   0    0/   0
   W2L limit/curr              0/   0    0/   0    0/   0    0/   0
   L2W limit/curr              0/   0    0/   0    0/   0    0/   0
```

Figure 87: Display PEP Statistics screen

The Final Test Menu The Final Test Menu is not used by installers. It is used at the factory to ensure the various DW4020 components are functional. The menu is shown below.

```
Final Test Menu:
   (a) LED Test Pattern
   (b) Ethernet Ports Test
   (c) Modem Signal Test
   (d) USB Port Test
   (g) Factory Information Read
   (z) Return to Main Menu
```

Figure 88: Final Test Menu

Other options

This section describes some other options in the Main Menu.

Display active routing table Menu Option (**d**) displays the current data in the Active Routing Table, shown in Figure 89. This data is read-only.

```
Main Menu (<?/CR> for options): d

Active Routing Table:
Entry   Destination Network   Gateway Address
Subnet Mask

Main Menu (<?/CR> for options):
```

Figure 89: Active Routing Table display

Reset history Menu Option (**h**) displays the reset history for the DW4020 as shown in Figure 90. One of the most recent 8 reset logs may be displayed. Index 0 is the most recently logged reset.

```
Time of Reset :       THU JAN 01 05:47:35 1970
Asserted at   :       t=tInterface ../../../source/sd/cim.c#1918:
Reset Type    :       Valid Software Reset
Reset Reason  :       Manual reboot via Install Console rr command
```

Figure 90: Reset history

This data is read-only.

Note that you reset the DW4020 by typing **rr** at the Main Menu prompt and pressing Enter. You can force the DW4020 to download new software keys by typing **rd** and pressing Enter.

Reading factory information

Option (**g**) displays read-only information from the manufacturer. This option automatically returns to the Final Test menu.

Appendix D

Configuring the installer laptop for IP addressing

This chapter explains how to configure your installer laptop PC so that you can register the DW4020. All DW4020s come from the factory with Dynamic Host Configuration Protocol (DHCP) enabled. Therefore, your installer laptop PC must have DHCP enabled and set to automatically obtain IP addresses..

Windows 98SE and ME

1. On the client computer, go to *Start→Settings→Control Panel* and double-click **Network**. See Figure 91.

Note: On Windows ME computers, choose View All Control Panel Options to see the Network icon.

2. A list of network components will be displayed. See Figure 92.
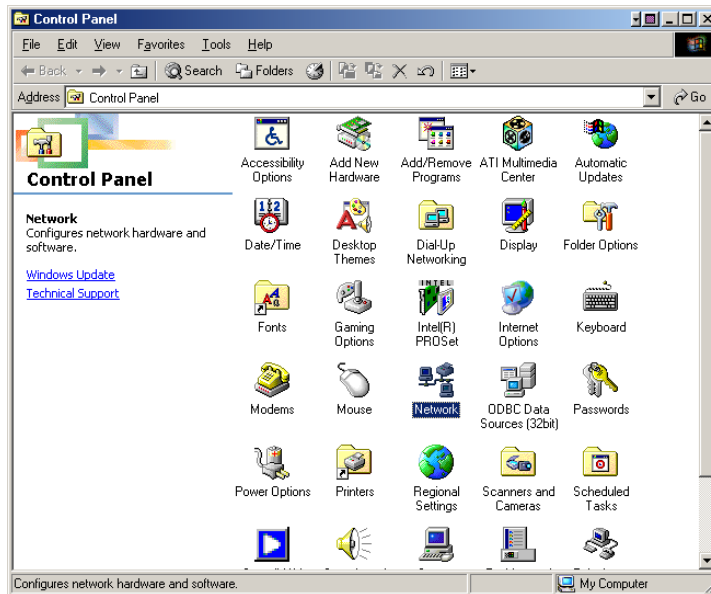
Figure 91: Control Panel
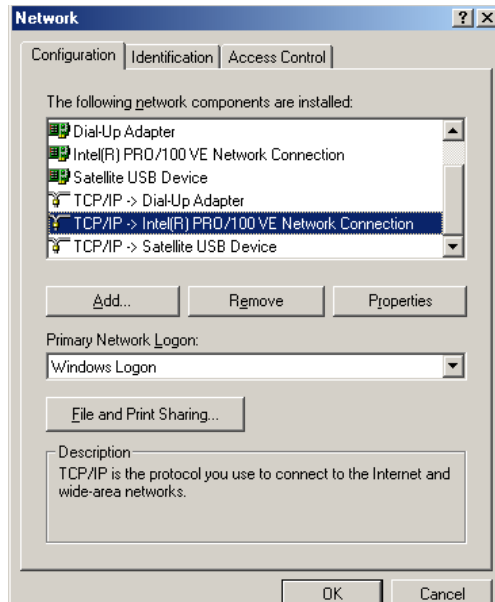
Figure 92: Network window

3. Select the TCP/IP entry associated with Network Interface Card (NIC) and then select Properties. The TCP/IP Properties window appears. See Figure 93.
4. In the IP Address tab, select Obtain an IP address automatically.
5. Select the Gateway tab. Remove any installed gateways by selecting them and selecting **Remove**. See Figure 94.
6. Select the **Disable DNS** radio button on the DNS Configuration tab.
7. Select **OK** to accept the updates for the TCP/IP properties

8. Select **OK** to close the list of network components. Windows may request the installation CD-ROM to complete updating the TCP/IP settings.

9. Restart the computer if it does not do so automatically.
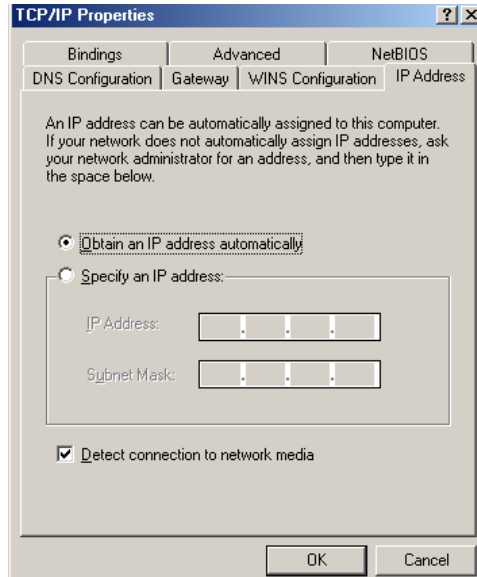
Figure 93: TCP/IP Properties
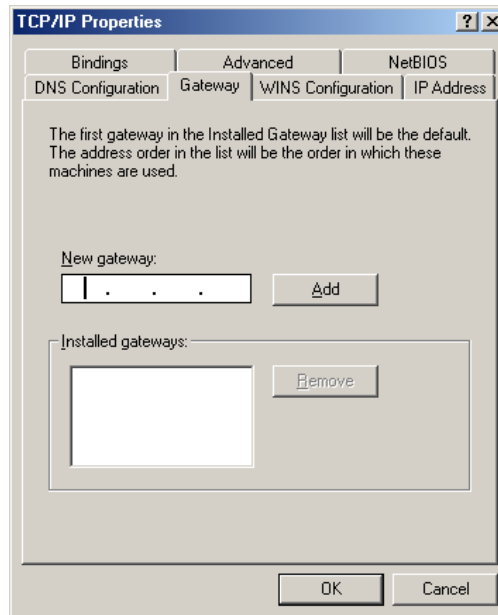
Figure 94: Gateway tab

Windows 2000
1. On the client computer, go to *Start→Settings→Control Panel* and double-click Network and Dial-up Connections.
2. A list of network adapters appears. See Figure 95. The Local Area Connection adapter must be listed. If it is not, the network is not installed correctly.
3. Right-click the Local Area Connection icon that represents the network adapter that connects the computer to the DW4020 and select Properties. The Local Area Connections Properties window appears. See Figure 96.
4. Ensure that the Client for Microsoft Networks and Internet Protocol (TCP/IP) are installed and checked. If NetBEUI is installed, uninstall it.
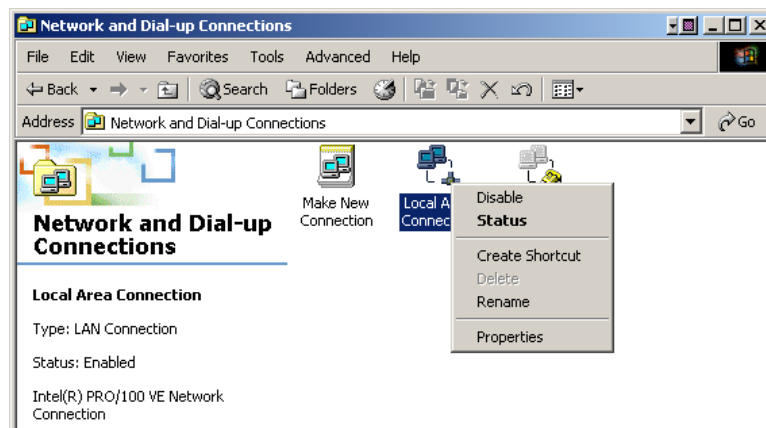
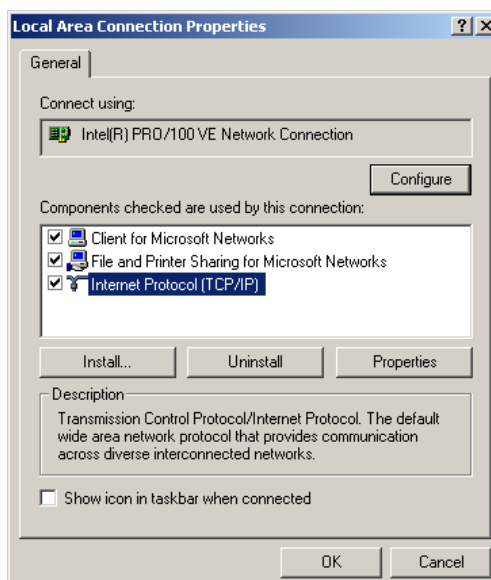Figure 95: Network and Dial-up Connections

Figure 96: Local Area Connection Properties

5. Select Internet Protocol (TCP/IP). Be careful not to uncheck the checkbox.
6. Select the Properties button. The Internet Protocol Properties window appears. See Figure 97.
7. Ensure that both Obtain an IP Address Automatically and Obtain DNS Server Address Automatically are selected. If not, select them.
8. Select **OK** to close the open dialog boxes and finish the configuration.
9. Restart the computer even if Windows does not require you to do so. This will ensure that the network settings are automatically reset.
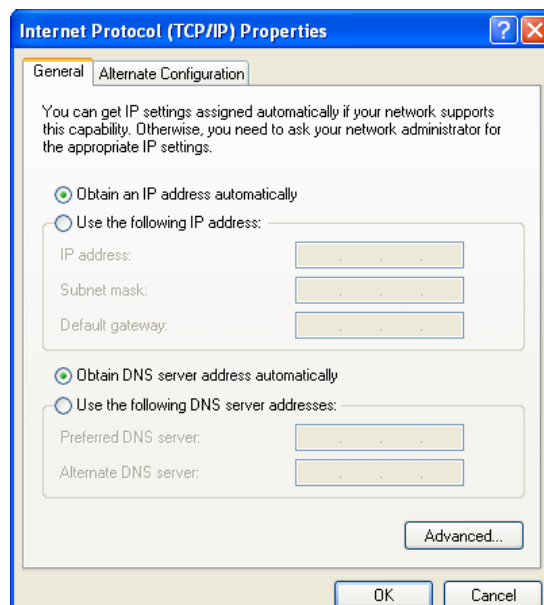

Figure 97: Internet Protocol Properties

Windows XP
1. Go to Start→Settings→Control Panel. Double-click the Network and Dial-up Connections icon.

Note: If the Control Panel is in category view select Network and Internet Connections then select Network Connections.

2. A list of network adapters will be displayed. A Local Area Connection must be listed under LAN or High-Speed Internet. If not, the network is not installed correctly. See Figure 98.

3. Right-click the Local Area Connection icon that represents the Network adapter that connects the computer to the Satellite Gateway and select Properties.

Note: If the Local Area Connection icon appears with a red X then check your connections. The red X must not be present in order for you to be successful.

4. Ensure that the Client for Microsoft Networks and Internet Protocol (TCP/IP) are installed and checked. If NetBEUI is installed, uninstall it. See Figure 99.

5. Select Internet Protocol (TCP/IP) and select Properties. See Figure 100.

Note: Be careful not to uncheck the Internet Protocol when you select it

6. Ensure that both Obtain an IP address automatically and Obtain DNS server address automatically options are selected. If not, select them.

7. Select **OK** to close the open dialog boxes and finish the configuration.

Restart the computer even if Windows does not require you to do so to ensure that the network settings are automatically reset.
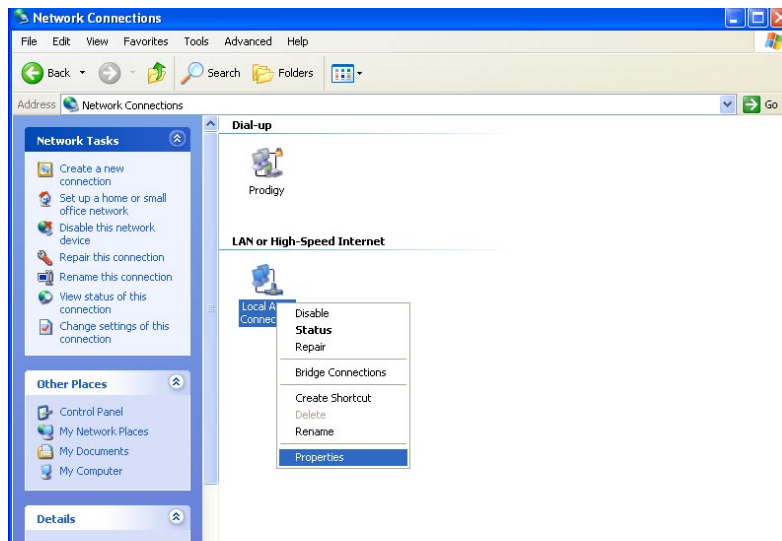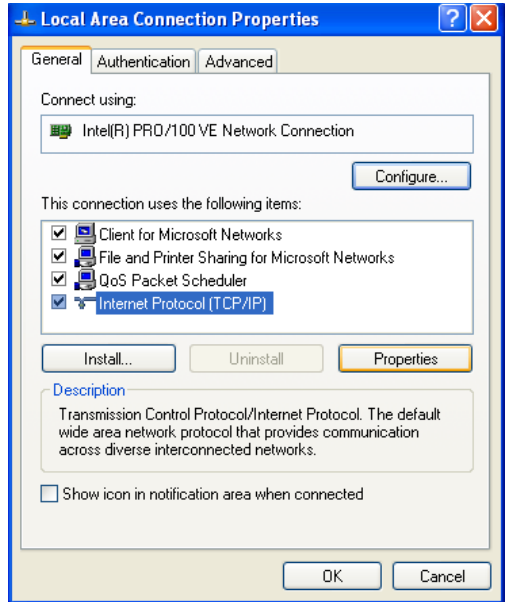

Figure 98: Network Connections

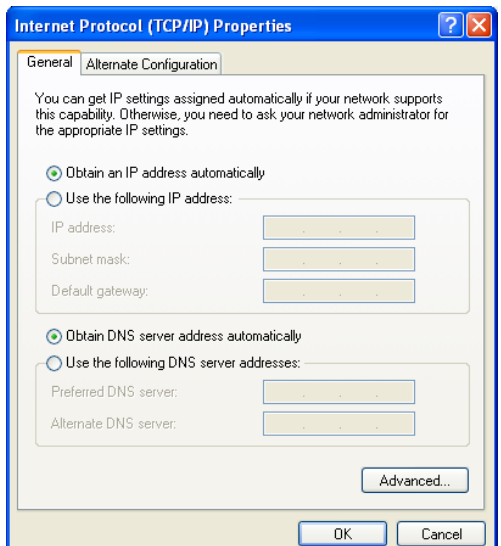Figure 99: Local Area Connection Properties

Figure 100: Internet Protocol Properties

Installation summary and checklist

The following DW4020 components are installed:

- Antennas (outdoor unit or ODU)
- Coaxial cable (IFL)
- DW4020

The main tasks required to install an DW4020 are summarized below. For Web commissioning, the customer should have an analog phone line and a functioning Ethernet interface.

☐ **Assemble the DW4020 components.** These consist of the receive and transmit modems, and the Gateway.

☐ **Connect the DW4020 to installer laptop PC Ethernet and power up DW4020.**

☐ **Connect the installer laptop PC via USB and run Websetup to establish operating parameters.**

☐ **Register the end user and select subscription options via Websetup.**

☐ **Record site ID, Gateway IP address, subnet mask, and service offering on cover of User Guide.**

☐ **Transfer of parameter information to Gateway. Exit Websetup.**

☐ **Assemble and install the satellite antenna.** Run cables from the outdoor components to the indoor equipment. Clearly label the receive and transmit coaxial cable at the antenna, ground block, and modem connectors.

☐ **Complete antenna pointing and auto cross-polarization (ACP).**

☐ **Disconnect installer laptop PC and connect the Gateway to the receive modem with USB cable. Connect the customer computer to the Gateway via Ethernet cable.**

☐ **Verify customer operation, information recorded on User Guide cover, and receive and transmit cable labeling.** Optional: assist in customer computer configuration.

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